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AMERICAN BUILDER

and Building Age

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DECEMBER, 1937

59th Year

Vol. 59—No. 12

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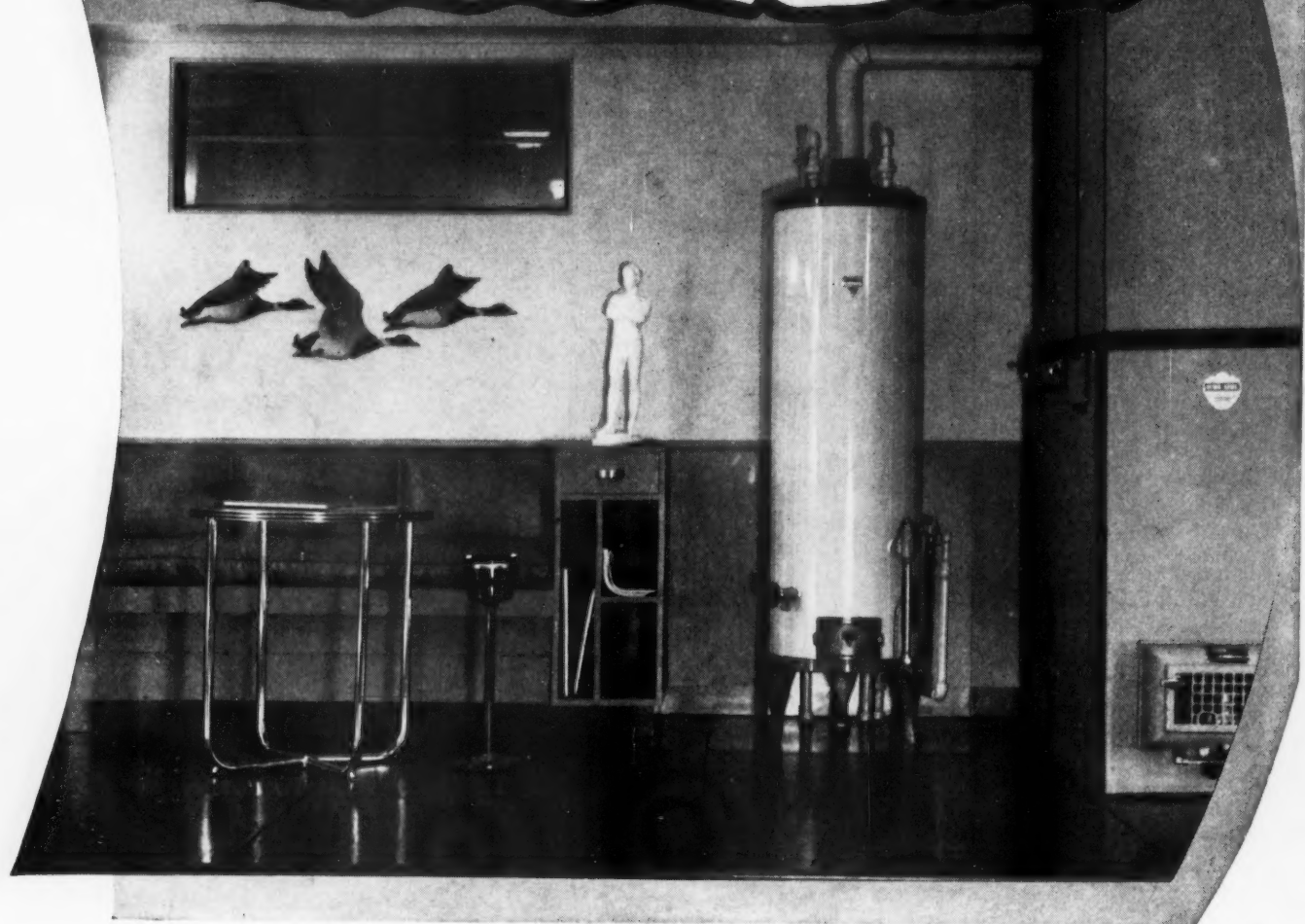
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PUBLISHER'S PAGE

Building and Business

"The predominating motive which stimulates man's acts in enlarging the constructive enterprises is *the instinctive desire for gain*. * * * It is this motive which prompts the erection of the great blocks of residences and the apartment and tenement houses in the large cities. * * * A large percentage of the residences in cities which are occupied by their owners were originally planned and built * * * by capitalists or professional builders for the purpose of renting or selling them *at a profit*; but even in the cases of houses built by their owners * * * it is the *instinctive desire for gain* which stimulates the production of the iron, lumber, brick, stone, cement, etc., which enter into their construction."—From a book entitled "Industrial Depressions" by George H. Hull, published in 1911.

BUSINESS has never since been as good in any year as it was in every year between 1922 and 1930. We have never even temporarily had real "recovery". The National Bureau of Economic Research recently published the most exhaustive study ever made of non-farm residential construction. It showed that in 1923-1929, inclusive, this kind of construction averaged \$3,968,000,000 annually; in 1930-1936, inclusive, only \$707,000,000; and in 1936 had increased to only \$1,202,000,000. In the first seven months of 1937 residential construction increased; and so did general business. Residential construction has since declined; and so has general business.

The facts show beyond any question that *the country's prosperity is largely determined by residential construction*.

Why, then, has residential construction never recovered to anywhere near the pre-depression level? Why have business in general and residential construction in particular become less in recent months than in 1936?

THROUGHOUT the longest and worst depression in history there has been occurring a great struggle between advocates of two opposed economic policies. One of these is that of relying upon the vitally important "instinctive desire for gain" emphasized by Mr. Hull, and affording *private enterprise* full opportunity to make profits by expanding construction, production and commerce. The *American Builder* has advocated this policy.

The other of these policies is that of a "planned economy"—of government making huge expenditures for "pump priming" and competition with private enterprise, while so regimenting and taxing private enterprise as to increase its costs, with the result of restricting its profits from existing investment and making entirely uncertain its profits from future investment.

The latter policy has been tried in this country *for the first time* during the last four and one-half years. What more should be required than the four years' failure of recovery, and the recent sharp decline of business, to vindicate those who have *opposed* this policy? What more should be required to convince the people that restoration of full opportunity to private enterprise to conduct business and *make legitimate profits* is essential to the *welfare of all*, and especially of the working class, *who must rely upon private enterprise for full employment*?

Samuel O. Dunn

SIMMONS-BOARDMAN PUBLISHING CORPORATION: SAMUEL O. DUNN, CHAIRMAN OF THE BOARD; HENRY LEE, PRESIDENT; BERNARD L. JOHNSON, ROBERT H. MORRIS, DELBERT W. SMITH AND ROBERT E. CLEMENT, VICE-PRESIDENTS; ROY V. WRIGHT, SECRETARY; E. T. HOWSON, ASSISTANT SECRETARY; JOHN T. DE MOTT, TREASURER. EXECUTIVE AND EDITORIAL OFFICES, 105 WEST ADAMS STREET, CHICAGO; 30 CHURCH STREET, NEW YORK CITY



From ugly building to appetizing cafe—with the help of Atlas White stucco. DiPinto's Cafe is located on Torresdale Ave., near Frankford Ave., Philadelphia. Owner and general contractor, A. Ferraco. Plastering contractor, A. Bonbeno—both of Philadelphia. Light buff colored exterior stucco furnished by Penn-Crete Products Co., Philadelphia.

Look again— It's the same Building!



Another example of how exterior stucco of Atlas White portland cement helps transform "eyesores" into handsome, profitable buildings

● Really amazing—the remodeling magic that's accomplished with exterior stucco of Atlas White portland cement.

On the job shown here, metal reinforcing was placed over the old brick walls, then three coats of stucco, with a finish coat of Penn-Crete light buff. Atlas Gray cement was used for the base coats.

When you are figuring on a remodeling job, remember these facts:

1. White portland cement stucco gives a building a fresh, bright and permanent exterior.

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3. It can be applied in any texture and any color.

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A FACTORY PREPARED STUCCO IS PREFERABLE



S-11

STUCCO MADE WITH **Atlas White** PORTLAND CEMENT

AMERICAN BUILDER

AND BUILDING AGE

Some of the News Is Good

IF IT is true, as the saying goes, that "a problem well stated is half solved," the recent U. S. Chamber of Commerce Conference on Residential Construction held in Washington was a success. Speakers from every branch of the industry dwelt on the problems of high taxes, high interest rates, rackets, building codes, labor restrictions, material costs, deterioration of communities, lack of planning, lack of confidence, lack of the home owning "urge" and, crowning all other problems, "lack of sufficient buying power to permit building." It must be admitted that at times this overwhelming piling up of problems gave the Conference an air of frustration that could hardly be said to stimulate increased home building. It was also evident that each division of the industry was inclined to blame some other rather than suggest sacrifices for itself.

It is encouraging indeed that following this Conference has come news of a great national home building drive to stimulate private building and private business, in which the U. S. Chamber of Commerce and its many aggressive local chambers in the cities and towns throughout the land will take an active part. It is particularly fitting that this housing drive which the Administration has taken pains to make clear is to be a *private* home building program financed by *private* business is to be carried on through such a well organized business institution as the U. S. Chamber of Commerce. The features of the program, described in detail on the following pages, call for effective co-operation between FHA, local chambers of commerce and local building interests. This recognition of the fact that home building is a local business is highly significant.

American Builder wishes this campaign well, and urges its readers to co-operate in every way possible. There is little doubt but what the fundamental position of the building industry is sound. There is a pressing need for millions of modern, well-built homes—particularly small homes. It is highly possible that this campaign is the final "push" needed to get the construction giant moving forward swiftly under its own power.

It is not false optimism to say that prospects for 1938 home building are encouraging. Too many people lately have been able to see only the bad side of business and political conditions. While not minimizing the problems we have with us, let us analyze some of the factors:

TAXES—It is true that high real estate taxes are the greatest current obstacle to large volume home building, and that it is an iniquitous and unjust system that places

60 percent of the national tax burden on real estate which produces only 20 percent of the income. As John McC. Mowbray, Baltimore builder, pointed out at the Chamber conference, on a \$4,260 house in his town, the \$119 real estate tax amounts to a 28 percent levy on the property's income. This is a terrific tax to place on such a socially and economically desirable institution as a home.

But from the viewpoint of new construction, it can be pointed out that the same tax is also paid by those who rent. It must be paid whether an individual lives in a rented apartment or a house built for his own needs. Furthermore, high city taxes are forcing more people to build in the lower tax areas—in small towns, suburbs and semirural areas. Thus while high taxes are holding up building in *high tax areas*, there is a correspondingly greater activity in low tax areas.

HOME FINANCING—Many thousands of today's "live" prospects will buy houses as soon as the new FHA plan permitting 90 percent loans goes into effect. (See article next page.) Builders know this. They have the prospects. The proposed reduction in interest rates will make additional thousands immediately able to buy. Establishing of well financed national mortgage associations will release extensive credit for home building, and will make it easier for builders to obtain both mortgage and construction money from local, state and national banks. Under new banking regulations banks will be able to discount such loans, or borrow dollar for dollar on them.

The trend toward lower interest rates and easier terms is definite and unstopable. As *American Builder* has frequently pointed out, a 1 percent reduction in interest rates on a long-term loan is equivalent to an 18 percent reduction in the first cost of the property.

THE URGE TO BUILD—This publication does not believe, as some speakers at the Chamber conference implied, that Americans have lost interest in home ownership. The proposed nation-wide home building program, led off by an announcement from the President and followed up by an aggressive FHA promotional campaign throughout the land, can do much to create the right kind of public sentiment. Builders everywhere have reported increasing numbers who come to look at model homes. It will take only a slight further incentive to transform these lookers into buyers. The easier financing terms, lower interest rates and increased public appeal should do much to make 1938 a good home building year.

Nation-wide Home Building Drive

FHA, Chambers of Commerce, Building Interests to Co-operate in Whirlwind Campaign for More Homes—Lower Interest, 90 Percent Loans, Easier FHA Terms to Stimulate Homes Built for Sale or Rent—Expect to Double 1938 Home Building.

AS THIS issue of the *American Builder* goes to press, high Administration officials are putting the final touches on a gigantic national home building drive under the joint leadership of the Federal Housing Administration, the U. S. Chamber of Commerce and private building interests.

It is to be a program of private construction, emphasizing small homes, and Administration sponsors expect the program to double the volume of home building in 1938.

Bills to liberalize FHA's lending powers are already before Congress. The entire program is being led off by a dramatic Presidential announcement. A whirlwind housing campaign will be led by a revised and revitalized FHA working in co-operation with local chambers of commerce and local committees. FHA will put several hundred salesmen into the field to assist in local drives. Millions of pieces of literature encouraging home ownership are already under preparation.

Thus President Roosevelt and his advisers again turn to housing as they did at the beginning of the first New Deal Administration to lead the nation toward a more substantial business recovery. With the graph-lines of business pointing sharply downward, it has become increasingly apparent to business economists and to the Administration that an increased volume of private home building is absolutely essential to a sustained prosperity.

The President has emphasized the fact that this is to be a private home building campaign financed by private funds. Because of the importance to the public of a large increase in home building, the direction and promotion of a nation-wide campaign must, of necessity, have a unified public backing.

Analysts of the present building situation agree that the time is ripe for a large home building program. There is a tremendous statistical backlog of needed homes. A recent estimate is that of Chairman John H. Fahey of the Federal Home Loan Bank Board, who says there is an actual shortage today of at least 1,600,000 residential units. With rents rising, the shortage growing and the pressure for modern comfortable homes every day becoming greater, the basic ground work is thoroughly prepared for a promotional drive of the type outlined. Operative builders who have universally reported large and interested crowds of people visiting their developments in recent months, but few sales, will appreciate that perhaps such a campaign will provide just the needed "push" to transform lookers to buyers.

As *American Builder* goes to press with this issue final details of the plan are as yet incomplete and further

revisions are possible. However, the general outlines are clear and in essence they are sound and constructive. They attack the home building problem on a broad front. Heading the program will be a prominent non-governmental businessman who will be chairman of a national U. S. Chamber of Commerce committee. In co-operation with FHA this committee will work through local chairmen in all important cities and towns, which will put on local campaigns involving extensive publicity, home shows, advertising and organizing of local building interests in a concerted drive to get construction started at once.

But this is more than a promotional campaign. Revision of FHA regulations, of banking regulations and provision of 50 million dollars of RFC capital for the setting up of a National Mortgage Association to give liquidity to insured mortgages will pave the way for the local building men to sell more homes. Briefly, some of the indicated steps in the program are as follows:

90 PERCENT LOANS—FHA regulations are to be liberalized to permit insurance of loans up to 90 percent of the value of moderate-priced homes. The indications are that this increase from an 80 to a 90 percent loan will be made available on properties valued at \$6,000 or under.

LOWER INTEREST RATES—Total cost of FHA mortgage loans is to be brought down to 5, or possibly $5\frac{1}{4}$ percent, including insurance and service charges. A vigorous attempt will be made to reduce all interest rates, the ideal being held up as $4\frac{1}{2}$ percent.

RFC MILLIONS—A large National Mortgage Association will be set up with 50 million-dollar capital stock financed by Reconstruction Finance Corporation. This association will, in effect, operate as a mortgage discount bank for FHA insured loans. It will have power to issue securities to the extent of 20 times its stock capitalization, which means a billion dollars.

Banks, insurance companies and financial institutions in all parts of the country will be able to discount their FHA insured mortgages for full value, thus making this type of paper liquid—a feature much desired by banking institutions.

One feature of the promotional plan is to encourage local banks to put more money into home building; and an extensive educational program will be embarked on to instruct local banks in the technique of making construction loans.

Debentures of the National Mortgage Association will be offered for sale to the public; and since the security consists exclusively of Government guaranteed mortgages it is thought that there will be a large market for such debentures at a low interest rate.

An amendment to Title III of the Housing Act will be sought, reducing the capital requirements for additional Federal mortgage associations from the present \$2,000,000 to perhaps \$500,000 to encourage the formation of a number of such institutions by private investors. These institutions will also be able to sell debentures up to 20 times their capitalization. It is hoped that large material and manufacturing interests will interest themselves in the formation of such associations, to encourage the flow of capital into home building at reasonable rates of interest.

Planned to Aid Private Business

MODERNIZATION CONSIDERED—Revival of Title I of the FHA providing for guaranteeing of a certain percentage of loans advanced by banks for modernization is recommended by the President.

LARGE PROJECTS QUICKLY—A major feature of the new housing drive will be to encourage immediate construction of more large home building projects—both houses for rent and for sale. It is felt that lower costs and quicker action can be achieved by building good-sized groups of houses. To this end Housing Administrator Stewart McDonald has already announced a new FHA rule providing for blanket mortgages on large projects of single-family homes, permitting partial releases from the mortgage as separate properties are sold. Such homes may be built either to rent or to sell, and will apply to projects where the original intention is to sell but undisposed properties are rented. McDonald announced that FHA, under the new amendments to the Act, expects to be prepared to insure mortgages on any type of project for any number of families, including row houses, apartment houses, two or three-story walk-ups and even combination structures with first floor partially used for business.

Large-scale small home projects for rental are to be strongly emphasized, as recent studies show a large proportion of the American population is unable, due to the temporary nature of their employment, to tie themselves down to ownership. In speaking on this subject, Stewart McDonald pointed out the exceptional opportunities offered by this type of building project, and said FHA is prepared to co-operate with private enterprise in de-

veloping housing projects of any size up to \$10,000,000. He said such an investment should interest land developers and land owners—particularly estates consisting partly of land.

A new ruling of FHA permits *limited dividend* corporations, engaged in building large-scale small home projects for rent or sale, to retain 8 percent profit—a 2 percent increase above the 6 percent maximum formerly in force.

A further innovation under consideration is the adoption of a ground-rent system in certain types of projects, in place of the requirement of actual ownership of land. Under such a plan, a cash equity as low as 5 percent may be possible. One Administration official emphasized to *American Builder* the determination of the Administration that under the new housing plan any individual will be able to purchase a new home and pay for it over a period of years for *less than his present rent*. This cost is to include all charges, such as taxes, interest, amortization and insurance.

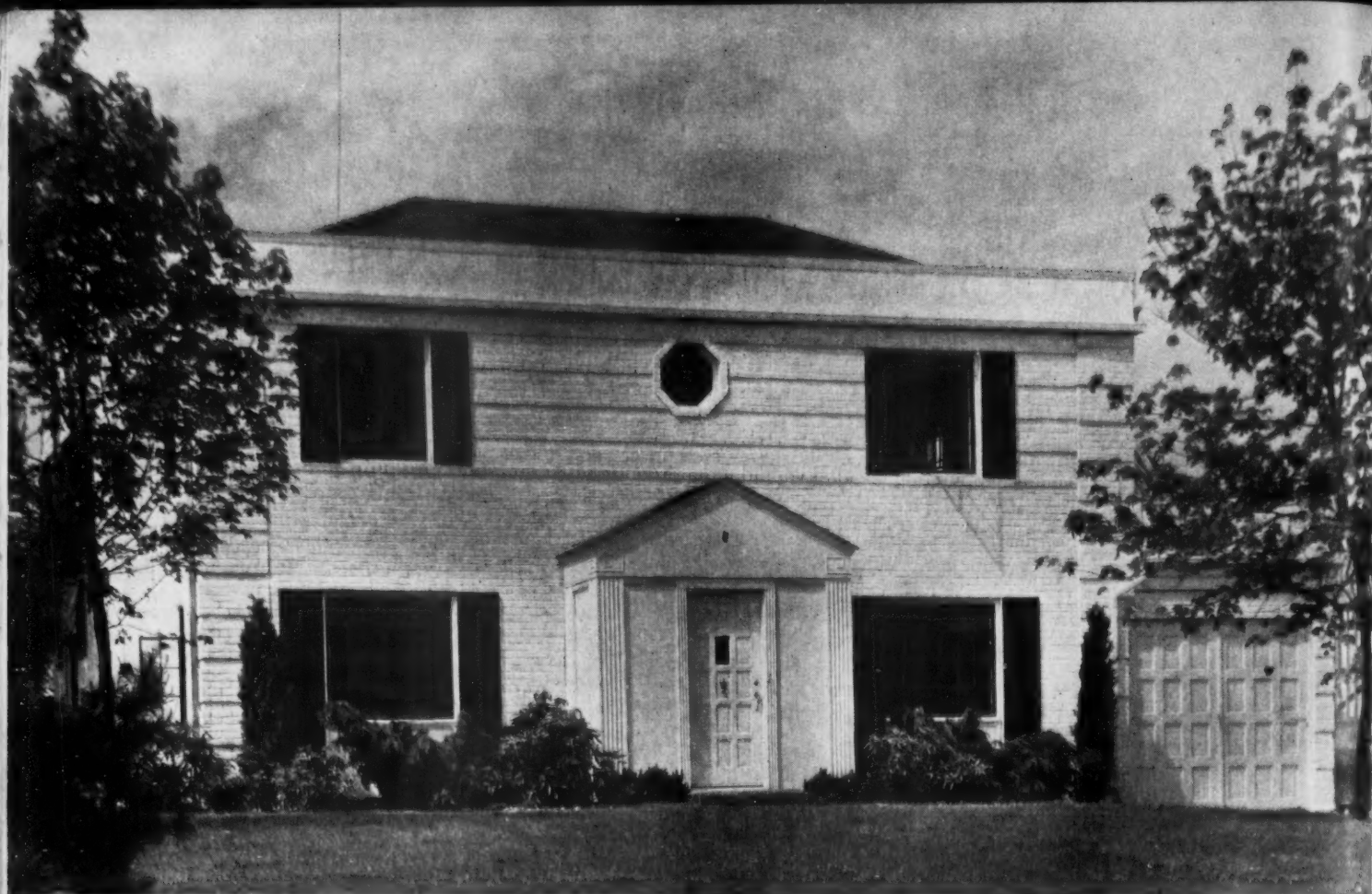
BANK REGULATIONS EASED—Federal Reserve Chairman Eccles and Treasury Secretary Morgenthau have taken an active part in the formation of the new housing plans. One of the important features already being put into effect is a revision and liberalization of the regulations of the Federal Reserve Board and the Federal Deposit Insurance Corporation to make insured home mortgages more desirable to state and national banks. By making this type of paper more easily eligible for loan or discount privileges with Federal Reserve Banks and by relaxing some of the over-stringent interpretations of the FDIC, much can be done to stimulate flow of the billions of idle banking funds into home building. In many small communities, it is pointed out, the local bank is the only source of mortgage and construction loans, and if bankers can be induced to enter this field more freely, a great volume of small-town and semirural home building could go ahead.

Building men throughout the nation are watching with great interest the development of this latest attempt to stimulate the residential building field. Because home building is so strongly affected by public sentiment, it is generally felt that a great deal of good can be done by a national campaign of this kind to get Americans thinking about home ownership. Most builders felt that FHA's modernization and home building campaign, following the passage of the National Housing Act, did a great deal to stimulate public interest. They believe that this new campaign carried on in an even more vigorous fashion, benefitting by the experiences of the past, should achieve very beneficial results.

BUSINESS MEN in general view the attempt to stimulate general business through a housing campaign as a step in the right direction. The fact that it is a private program using private funds is important. It is not to be confused with the recently passed Wagner Housing Act providing for slum clearance in cities. Those familiar with the details of such projects realize it will be some time before the slum clearance program can be put into effect. The new private small home building program, however, can have an immediate effect on home building and is expected to improve materially residential construction in 1938.

Highlights of New Home Campaign

1. FHA to insure 90 percent loans.
2. FHA restrictions modified to encourage large-scale projects for rent or sale.
3. Lower interest rates indicated.
4. Labor agreements on basis of 40-week annual wage.
5. RFC to advance \$50,000,000 for National Mortgage Association Capital as a base for \$1,000,000,000 debenture fund with which to discount FHA insured loans.
6. Bank regulations on FHA mortgages modified.
7. "Ground-Rent" system proposed to permit lower initial down payment.
8. Chambers of Commerce to co-operate with FHA in vigorous local housing campaign.



SIX HOME DESIGNS

As Modern as the
1939 World's Fair

34

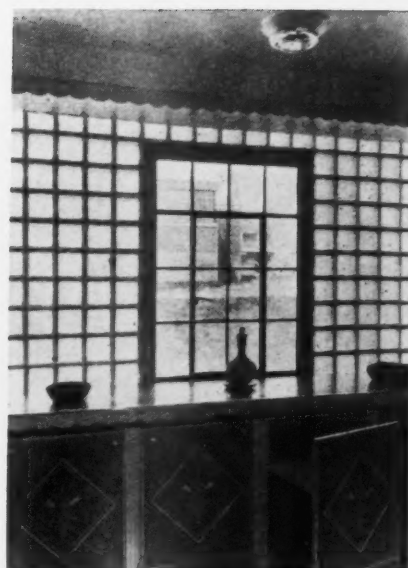
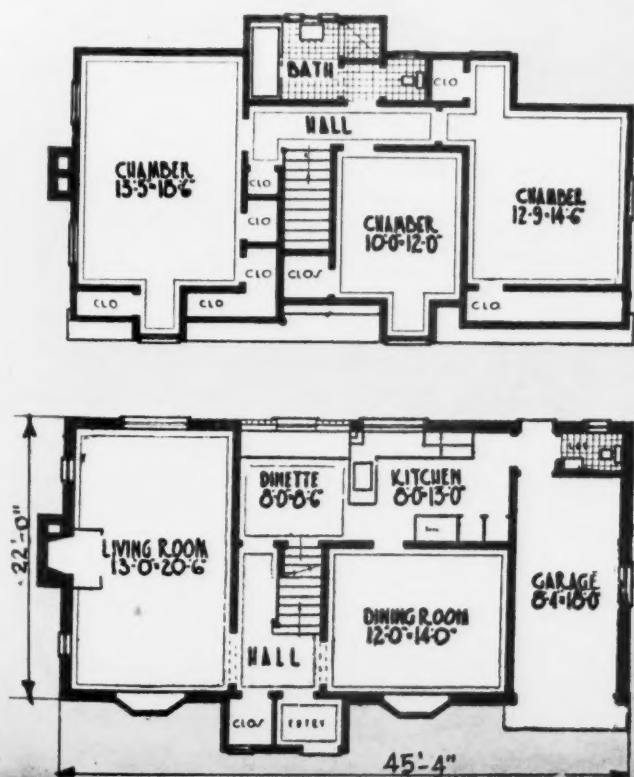
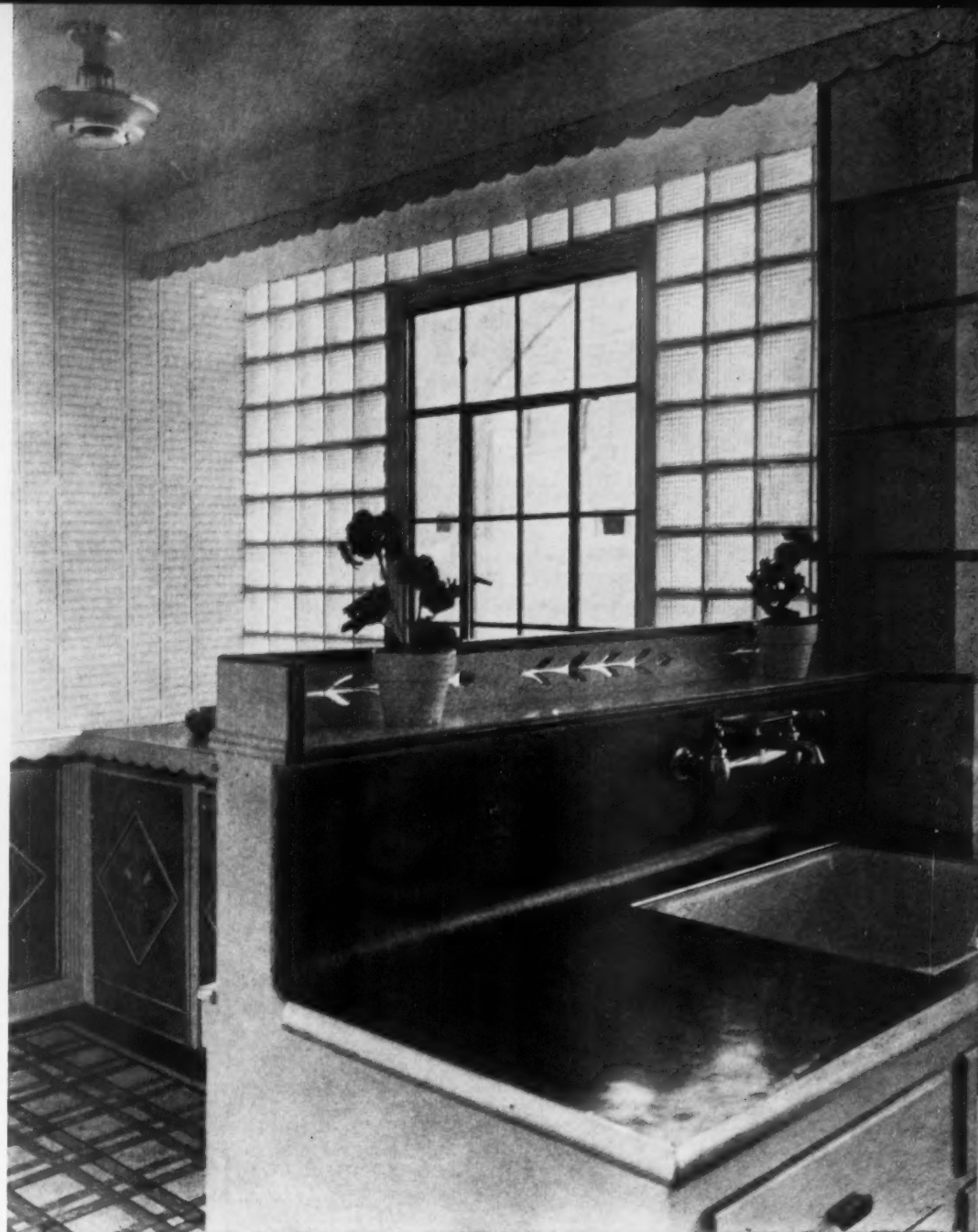
THESE TWO EXCITING DESIGNS with approximately the same floor plan are part of Alvin B. Wolosoff's newest development—Kew Gardens Hills, overlooking the site of New York's 1939 World's Fair. Set on 60 x 100 ft. lots, the Wolosoff houses are full of modern conveniences and devices and illustrate effectively the high value of the 1937 home. The designs are by architect George E. Titus.



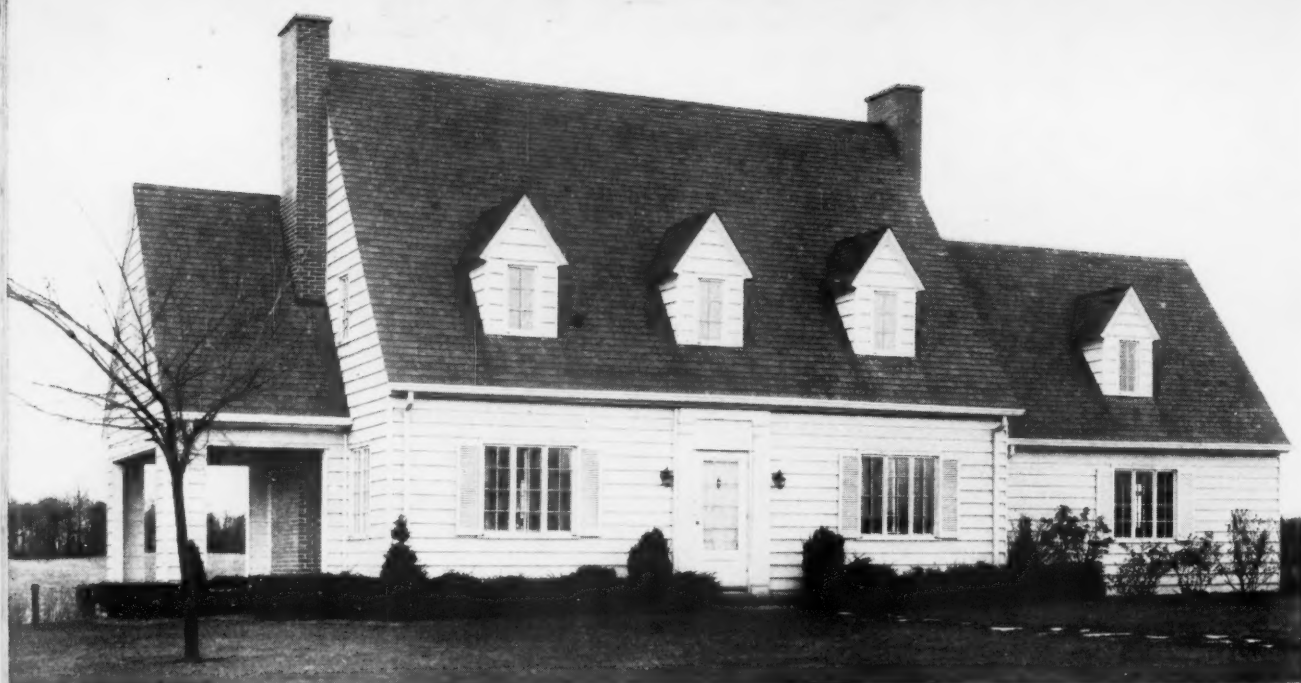
Kitchen-Dinette with Glass Brick Walls

GLASS BRICK WALLS in the kitchen and dinette flood the room with light. Steel casement windows are set in the glass brick. The kitchen is expertly laid out, with the wing projecting into the room and separating kitchen from dinette. A built-in "Breakfast bar" with seats that pull out is provided.

FLOOR PLAN below has several exterior arrangements, including the popular Modern style. The center hallway providing entrance to all important rooms is good. The bathroom, with the toilet in a separate compartment, is another popular Wolosoff feature.

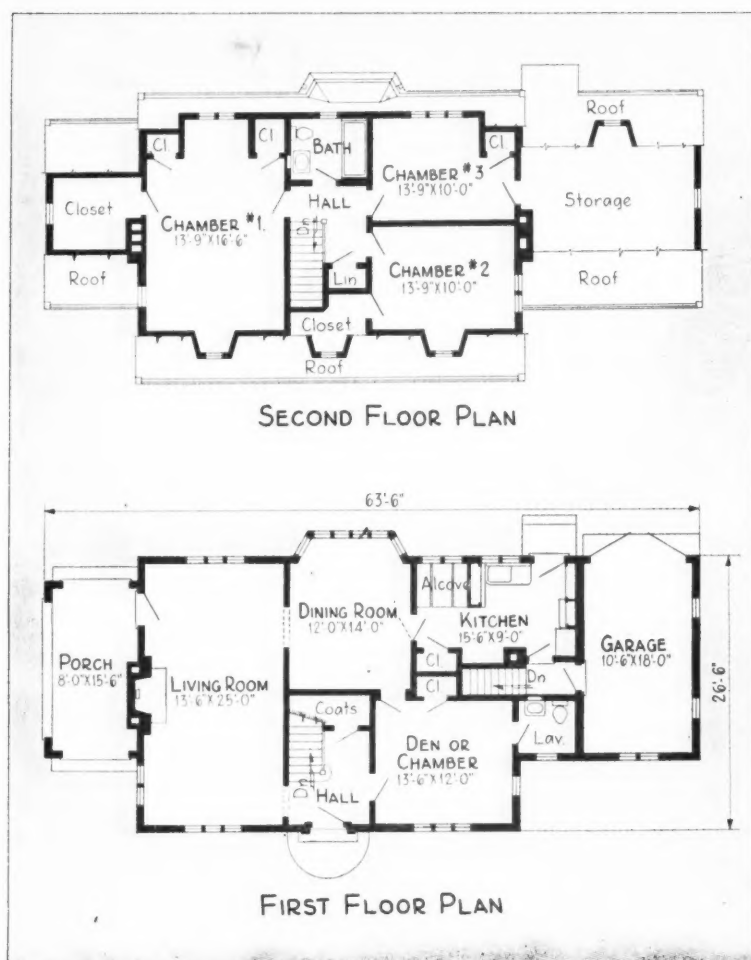


THE CHEERFUL "BREAKFAST BAR" has four clever built-in seats which can be easily pulled out.



FRONT COVER "DRI-BILT" HOUSE IN ASHLAND, OHIO

Cost Key is 2.680—184—1409—59—30—35



**An All-Lumber Home Having
Seven Rooms and Attached
Garage, Designed by Architect
A. Raymond Ellis, Hartford,
Conn. S. H. Hanville, Owner**

THE EXTERIOR of the above home is designed in the popular Cape Cod style with garage and living porch wings to balance at the ends and give the appearance of increased size. In plan the layout is efficient; good circulation, plenty of storage facilities and a minimum of waste space are found on both floors. A large bay in the dining room overlooks the garden view to the rear. Lighted breakfast alcove is conveniently located. The den or book room with adjoining lavatory shown on the opposite page can be used as an extra guest room when needed. It has walls richly finished in luan plywood paneled with black walnut; mahogany doors further add to warmth of the wood finish. The specifications indicate a wide use of plywood throughout the construction of this house.



THE DEN can be converted into a guest room; the combination of woods used for wall finish and trim is very pleasing.

OUTLINE SPECIFICATIONS

FOUNDATION: Concrete footings; 5 x 8 x 12 tile walls; basement and garage floors, 4" concrete; drain tile around wall to insure dry basement.

EXTERIOR WALL: 5/16 Westboard sheathing; brown 1" mesh rope Kraft waterproof paper; 3/8" plywood furring strips 16" on center; 3/4 x 10 cl. Maltese Cross red cedar siding.

EXTERIOR FINISH: All clear Maltese Cross red cedar; fir gutters; roof, 5X clear 16" Maltese Cross red cedar shingles; chimneys, common brick.

EXTERIOR DOORS: House, 1 3/4" white pine; garage, 1 3/4" fir, overhead type.

WINDOWS: Andersen casements equipped with double glazing and screens.

EXTERIOR PAINTING: 3 coats of Truscon house paint.

FRAMING LUMBER: Weaver Bros., Shreveport, La.; No. 1 Y.P.; all sub-floors 5/16" fir plywood sheathing.

FINISHED FLOORS: Dining room, living room, hall and book room—3/4" laminated random plank oak flooring, Tudor finish; kitchen, back hall and lavatory downstairs—sub-floors 3/4" No. 2 D. & M. Y.P. covered with 1/4" Westboard, wallboard grade, this covered with inlaid linoleum. Upstairs: Bedrooms and hall, finished floor

3/8" x 2" oak, Tudor finish. Bath, sub-floor 3/4" No. 3 Y.P. 1 x 6 D. & M. covered with 1/4" Westboard, wallboard grade, this covered with inlaid linoleum.

BATHROOM WALLS: Shower and 4' high outside shower, Marsh wall tile; ceiling of bath 5/16 Westboard sheathing grade covered with Sanitas canvas, painted.

ALL INTERIOR WALLS except kitchen, lavatory, closets and book room, covered with 5/16 Westboard, sheathing grade, nailed and glued to studs, with 2 x 4's laid in so that all joints of plywood have solid surface to nail to. This covered with Sanitas canvas, painted with Truscon Ascepticote. Book Room Walls: 1/4" Buffco luan plywood paneled with black walnut, finish black walnut; doors 6 panel 1 3/8" Philippine mahogany. Kitchen, Closets and Lavatory Walls: 1/4" Westboard, wallboard grade, painted with Truscon Ascepticote. All other interior doors, except as mentioned above, 1 3/8 white pine 6 panel.

INTERIOR TRIM: Clear sap popular, ivory enamel finished.

HEATING: Vapor system, gas fired.

PLUMBING: Copper pipes; Humphrey Mfg. Co., Mansfield, O., fixtures.

INSULATION: Ceiling of second floor, 2" rock wool. All doors and windows weatherstripped.

WATER HEATER: Full automatic control.



LAUNDRY AND SERVICE WING IN UNUSUAL ARRANGEMENT

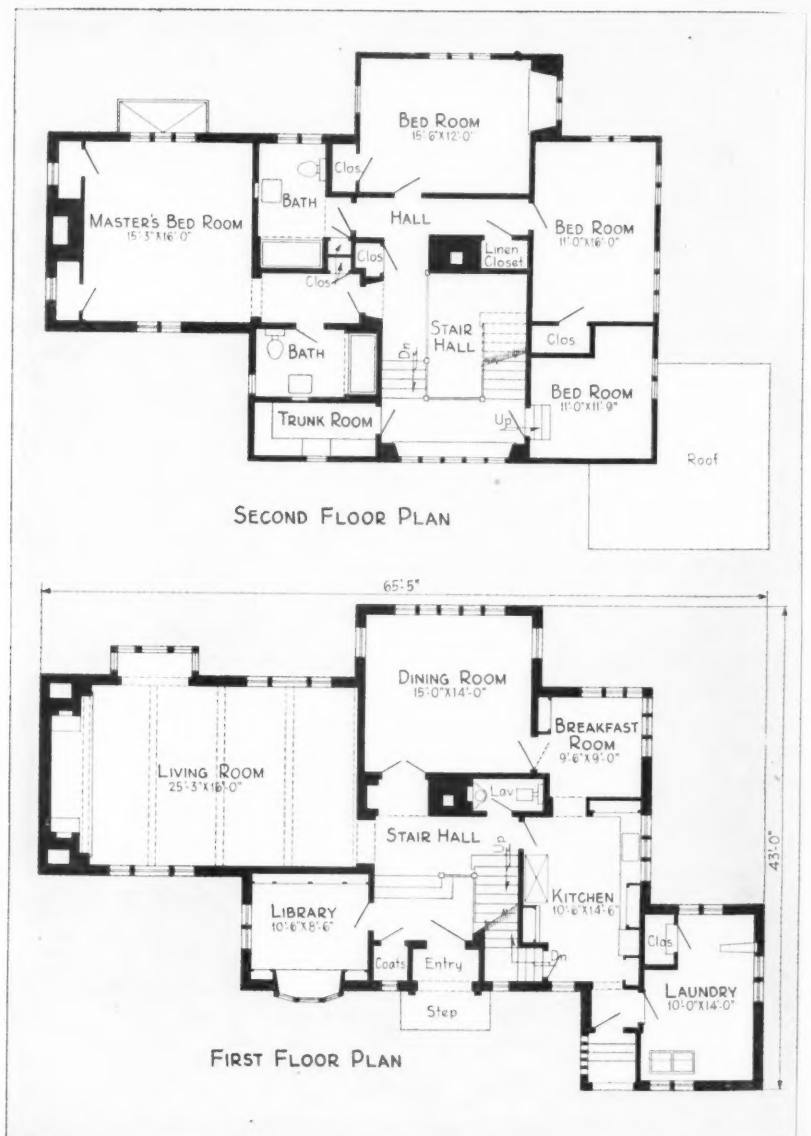
**Home Located at Haller Lake,
Seattle, Wash.**

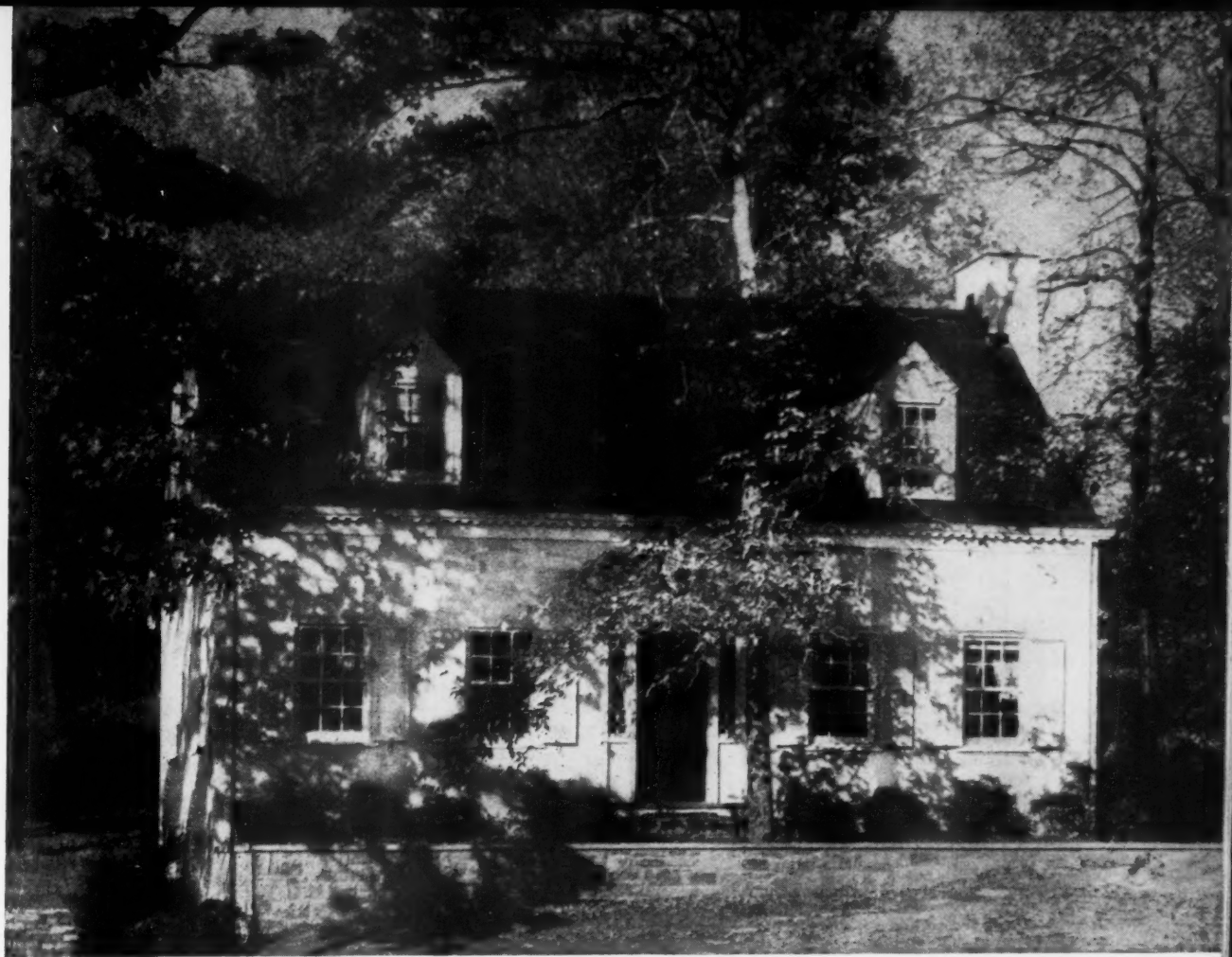
**George Wellington Stoddard,
Architect**

A. S. Hansen, Builder

THIS EARLY AMERICAN farmhouse with exterior finish of handsplit cedar siding and painted brick fits naturally into the landscape on the banks of Haller Lake, at the edge of the city limits of Seattle, Wash. A novel feature of the house is the wing containing the laundry and service entrance at the front, as seen above; this spacious room with large fruit closet has direct access to the kitchen.

FIVE comfortable rooms downstairs include long beamed ceiling living room with ingle nook filling one end, small library adjacent to entrance hall where the owner transacts business affairs, dining room, breakfast room and kitchen. Entrance hall and library have floors of Vermont and Pennsylvania slate, which is also used on two low stairs, treads and risers connecting with the oak floor stair hall. Upstairs are owner's quarters consisting of bedroom with large twin closets, linen room, and bath, which comprises a separate unit with small circulating hall branching off from the main hall; two additional bedrooms and spacious trunk room. Two car garage and large work shop are built separately from the house.



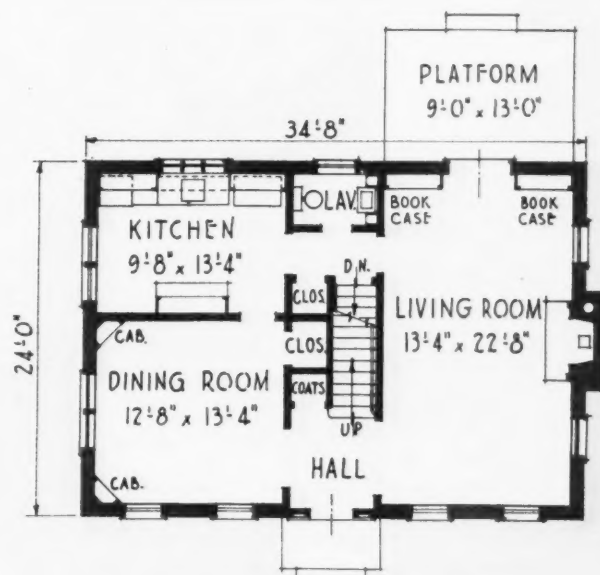
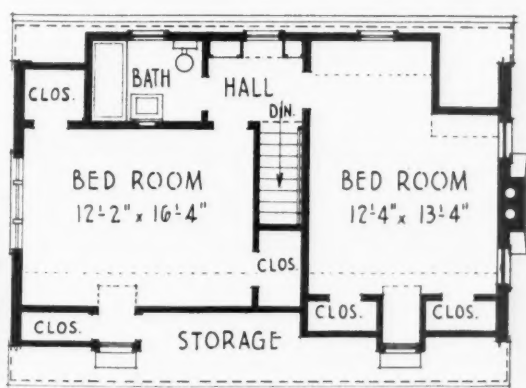


CAPE COD COTTAGE IN CONCRETE MASONRY

Erik Kaeyer, Yonkers, N.Y., Architect

TAKING advantage of the plot which is lower on one side, this Bronxville, N. Y., home provides a compact arrangement of five rooms and basement garage within an overall size of 24x35 feet. The back hall gives access to lavatory, basement service entrance, living room and kitchen. On the second floor there are two good sized bedrooms and bath; closet and storage space is ample.

Cost Key is 1.595—117—832—35—18—12





IN THE COUNTRY WITHOUT BASEMENT

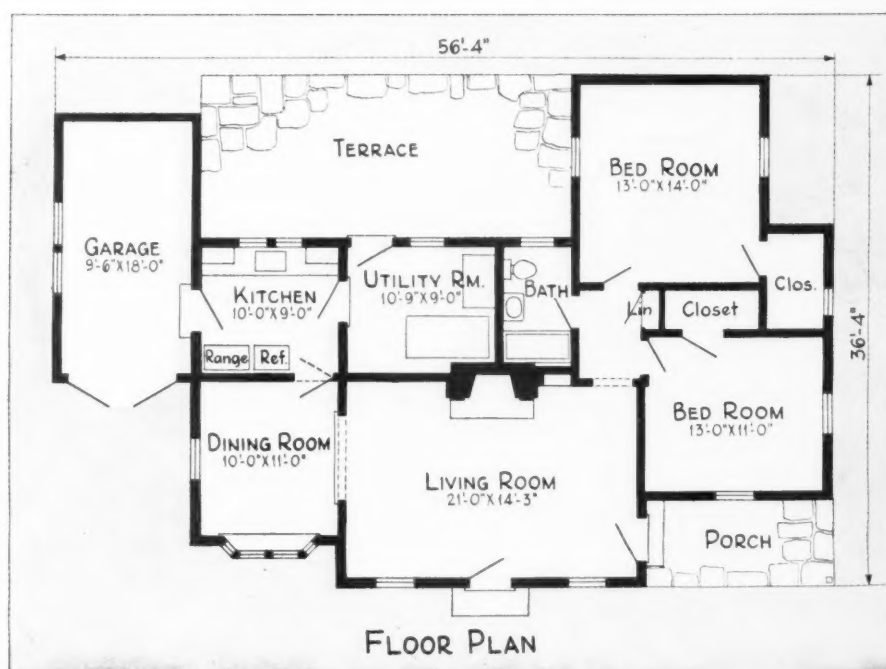
**Built by J. H. Marling, Chicago,
and Located in the Skokie
Ridge Suburban District**

Cost Key is 1.541-206-(1180)-(51)-23-20

THE LOW, rambling lines of this suburban homestead are in keeping with the open country site on which it is built. Red cedar shingles painted white were used on the walls and the same material, stained a dark gray, covers the roof. Details such as vertical boards and battens in the garage gable, diamond paned bay and blue-green shutters add to exterior interest.

The house is well arranged in plan. Being without basement it was necessary to provide a utility room; this is centrally located between bath and kitchen, and the gas-burning Comfortmaker heating plant uses a flue in the fireplace chimney. Bedrooms and bath are separated from the remainder of the house by a small hall. A large terrace at the rear provides for outdoor living. Cross ventilation and ample closets are provided.

FOLLOWING the trend toward building in areas beyond the city limits where lower land costs and taxes allow larger sites, houses such as the one above appeal to a certain class of owners who want to get out in the "country." In such cases the problem of water supply is important and requires either an individual well or community system, as was used in this case. A 175-foot well, pump and 540-gallon pressure tank are housed in a pump pit below grade with access through a manhole. This system supplies water to several surrounding homes at a minimum cost.



HANDBOOK OF DOUGLAS FIR PLYWOOD

PLYWOOD,

THE MODERN MATERIAL

Subflooring, Sheathing, Roof-
boarding

Dry-built Walls and Ceilings

Decorative Plywood Panels

How to Finish Douglas Fir
Plywood

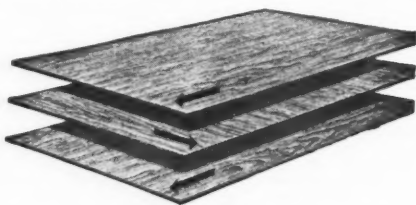
Special House Constructions

Plywood for Stores and Shops
and Industrial Buildings

Grade Use Guide

Plywood, the Modern Material

PLYWOOD is defined by the U. S. Forest Products Laboratory as "a piece of wood made of three or more layers of veneer joined with glue and usually laid with the grain of the adjoining plies at right angles. Almost always an odd number of plies are used to secure balanced construction."



DETAIL showing construction of Douglas fir plywood panels. Each veneer is placed in such a position that the grain of the succeeding veneer is at a 90 degree angle to the previous veneer.

Manufacture

Selected logs of Douglas fir, one of the two best structural woods in the world, are cut into "blocks," usually about nine feet long. The block is placed in a giant lathe and rotated against a long sharp knife which peels off the wood in a thin continuous ribbon of veneer, of the exact thickness desired, much as wrapping paper is unrolled. The ribbon of veneer is carried on conveyors to the clippers where defects are cut out and the veneer is clipped to desired widths. Next the veneer is sent through automatic driers to remove all but 2 or 3 percent of moisture, and then to the glue spreaders where expert workmen lay up the sheets crosswise in an odd number of plies, usually 3 or 5. The stacks of veneer sheets are placed in hydraulic presses and clamped under pressure of 150 pounds or more per square inch, until the glue has set stronger than the wood itself, transforming the sheets of veneer into strong, rigid panels of Douglas fir plywood. These panels are cut accurately to desired size, machine-sanded to a satin smoothness, and after a final check by Association inspectors are ready for shipment.

Glues

The adhesives used in manufacturing Douglas fir plywood are the strongest, most highly water-resistant protein glues known to modern science. The base for these remarkable cold glues is chiefly soya bean, blended with casein. Combined with expert workmanship and a skillful technique, such glues produce stock fir plywood

that is permanent for all normal interior uses, even when exposed for long periods to high humidity and some moisture.

Standard panels of Douglas fir plywood, even with the high water-resistance of the cold-pressed glues, are not recommended for permanent exterior exposure. True, a special grade of fir plywood is made for concrete forms and re-uses 15 to 20 in number are not uncommon.

Synthetic Resin Glues: To meet the demand for a strictly waterproof glue line, hot-pressed, resin-bonded Douglas fir plywood is now available for such severe exposures as house exteriors, boats, surf boards, signs and billboards. Experience records from Europe, as well as numerous tests, show that synthetic resin glue is as unaffected by water as bakelite or similar materials.

Physical Properties

The special features which make fir plywood important to the construction industry are:

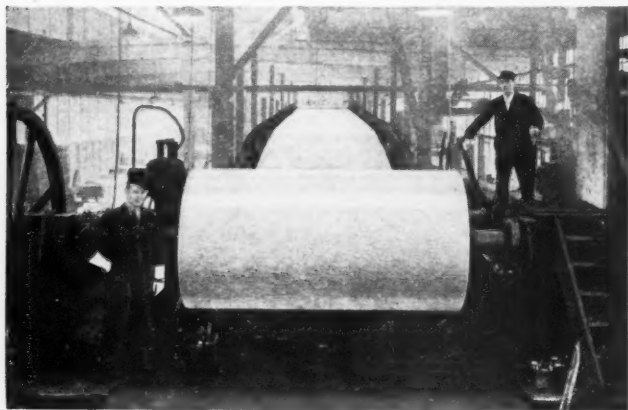
1. Large panel sizes
2. Strength and rigidity both lengthwise and cross-wise
3. Practically no shrinkage or expansion
4. Minimum of warping
5. Non-splitting

Large plywood panels meet the demand for a material with a minimum of joints, totally impervious to air, sturdy, yet handled easily by one man. Speedy, economical application is thus assured.

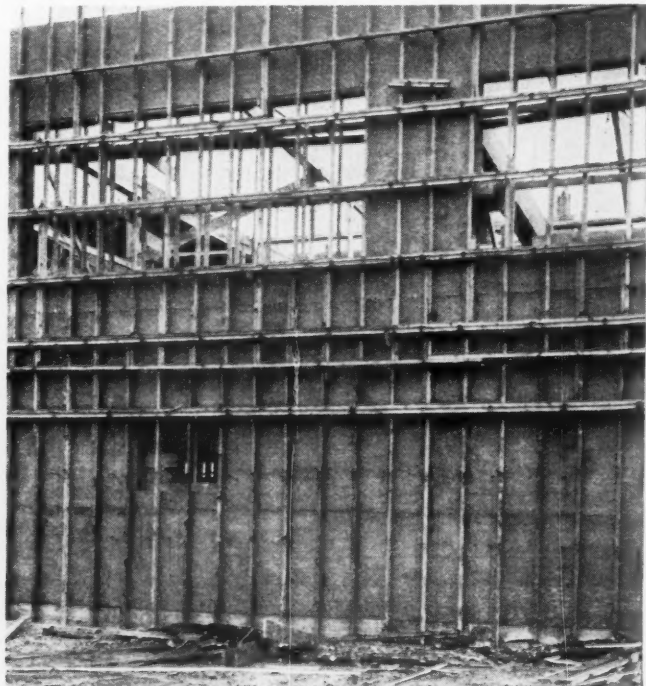
The factors of strength, freedom from splitting, warping and shrinkage are linked with the cross-banding of the thin veneer sheets from which the plywood is formed.

Along the grain, wood possesses a tensile strength and stiffness many times that across the grain. Along the grain, wood has practically no expansion or shrinkage.

Since fir plywood, through its cross-banding, has wood fibres running both along and across the panel, it acquires great strength and stiffness in both directions, as



HUGE Douglas fir log cut to length and ready to be fed to the rotary veneer knife.



PLYWOOD concrete form panels produce smooth concrete surfaces. View shows Seattle factory under construction.

well as immunity from the effects of moisture changes—the longitudinal fibres in one veneer prevent the adjacent, tightly-glued sheets from shrinking or expanding. This also minimizes any warping tendency. Finally, the cross-bands prevent splitting. It is possible to smash the edge of a plywood panel with a heavy axe, but it cannot be split.

Advantages of Plywood

Such artificial properties combine with the natural strength, workability, heat resistance and other properties of the Douglas fir wood to form a building material of varied potentiality, one which for many purposes approaches the ideal in both the industrial and the construction fields.

Plywood's suitability to various industrial purposes depends upon the specific requirements for each use.

In auto bodies and trailers, for example, strength, large size, light weight, and workability are important. For railroad car lining, the strength and rigidity of plywood, as well as its tightness against dust, cinders, or grain leakage, are vital. In models and foundry patterns, toughness and workability are prime factors. Scores of examples of industry's capitalization on plywood's unique properties could be listed, but most important of all, probably, is the application of Douglas fir plywood to the Construction Industry. Everyone is familiar with plywood in door panels, and in wall paneling, as well as in kitchen cabinets and built-ins.

The building industry has become familiar with the more recent adaptations of fir plywood, steadily increasing in volume during the past six years, for such structural purposes as subflooring, side-wall sheathing or boxing, and roof sheathing. In the following pages, these and many closely allied uses will be described in accordance with details of best modern practice.



LARGE plywood sheets speed exterior wall construction. Photo shows panel joint in a special system of construction, which is grooved out with electric router, then coated with glue and fitted with special spline. After the glue is set, spline is sanded flush.

Select Proper Grade

In view of its diversified uses, fir plywood is manufactured in several different grades and types, thus providing for any service, a material that is best suited to the requirements.

Four "appearance" grades are produced, i.e., G2S (good two sides); G1S; So2S (sound two sides) and Wallboard. All of these are sanded smooth to the exact sixteenth inch thickness desired, and are suitable for interior paneling, partitions, and cabinet work. A "GOOD" side or face in a panel is one piece of practically clear Douglas fir veneer. A "SOUND" face may have several neatly made patches, but is suitable for painting, or even a natural finish.

Supplementing the Wallboard grade which has a sound face and is by far the most popular plywood grade, is the Sheathing or Utility grade. Since this is unsanded, it has thicker faces than any of the other grades and consequently is stronger and more rigid. It is this Sheathing grade that is becoming so popular in the 5/16 and 5/8-inch thicknesses for house construction.

For formwork a Concrete Form Panel grade is made with a cold glue, specially high in water-resistance which permits a large number of re-uses, fifteen and more being by no means uncommon.

As already mentioned, hot-pressed resin-bonded fir plywood is available not only for temporary formwork, but also for permanent exposure in boats, store fronts, exteriors of houses, service stations, and other structures. This resin-bonded plywood with its strictly waterproof glue line, supplements the regular stock panel grades with their water-resistant glue-lines, and augments the applications of Douglas fir plywood to cover almost any type of service.

Construction

The use of plywood in construction may be divided into two classes.

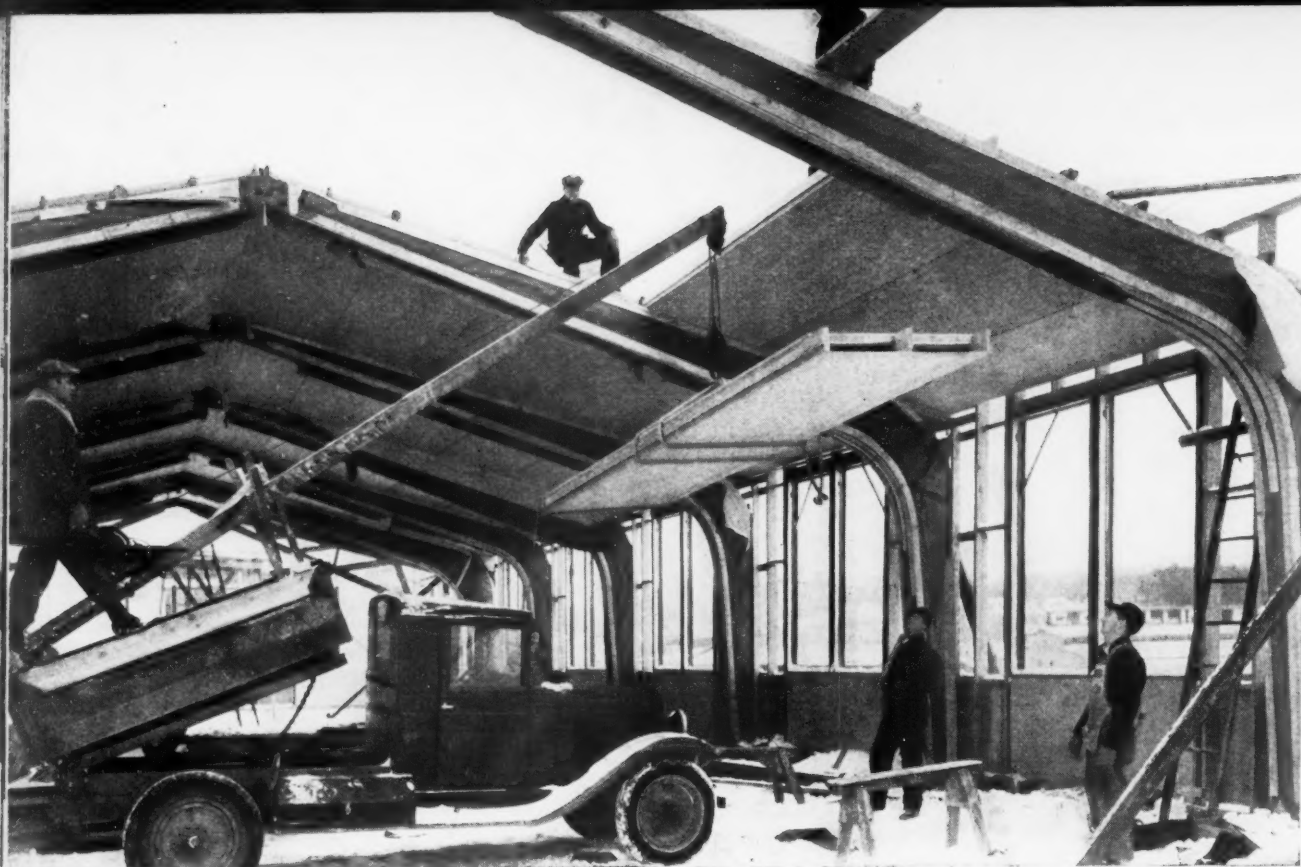
First are the conventional applications for sheathing, subflooring, paneling, formwork, and the like, which represent by far the largest volume and the greatest potentialities.

Second, is the prefabricated field, including both partial and total shop fabrication, or, fabricated units for walls, roofs and floors, and entire rooms.

Prefabrication has been attempted for years with a host of materials and combinations of materials. Plywood, and particularly Douglas fir plywood, because of its economy, strength properties and limitless supply, has seemed to offer the greatest possibilities in this field. Numerous laboratories, research groups, architects, and builders have tried out plywood in prefabrication. The U. S. Forest Products Laboratory, with its prefabricated plywood houses, was one of the pioneers in the shop-built plywood wall unit, floor panel, and roof panel.

Two new plywood houses are now nearing completion under the direction of the Laboratory.

During the past few years the Purdue University Housing Research Project has conducted painstaking investigations on various materials along similar lines, and is now building a plywood prefabricated house. Such experienced technicians as Joseph Weston of Los Angeles and Harry Durbin of Detroit have turned to partial shop fabrication as a means of practical economy. E. A. Horn in Seattle has developed ingenious plywood wall sections which dovetail quickly, simply, and strongly, and which give promise of adaptability. Details of one of his earlier plywood houses appeared in the July 1937 *American Builder*. How far such developments will go, no one



PREFABRICATED roof panel being erected at Forest Products Laboratory, Madison, Wis.

can predict, but the trend is definite and will be followed closely by progressive minds in the construction industry.

In the meantime, the more familiar and conventional methods of using fir plywood must come in for major consideration.

Let us start with the conventional house, after foundation and floor joists have been laid.

Subflooring

Douglas fir plywood offers an almost ideal material as subflooring. The giant panels, with their laminations furnishing an all-directional strength and distributing stresses from concentrated loads over wide panel areas,

provide a smooth, tight platform of surprising and superior rigidity.

For residences, fir plywood subflooring is preferably $\frac{5}{8}$ -inch "Sheathing" grade. Both tests and experience have proved its adequacy. Tests show that a $\frac{5}{8}$ -inch plywood panel, laid without nailing over 16 inch joist spacing, will take a uniform load of more than 160 lbs. per square foot, and yet deflect less than $\frac{1}{20}$ th of an inch. Experience on numerous jobs shows that a $\frac{5}{8}$ -inch plywood subfloor offers a rigid platform free from any apparent deflection under heavy conventional loads, and a safe working base. A typical experience is that quoted by Geo. E. Todd & Son, General Contractor near Los Angeles, California, on a large residential job.



SUB-FLOOR of $\frac{5}{8}$ " Douglas fir plywood gives smooth, rigid working platform. Photo shows residence of Earl Hoffman, Los Angeles.

"We were very much pleased with the speed with which we were able to apply the plywood.

"It took us, that is, four carpenters, two hours to lay and nail 2000 board feet as a subfloor—normally it would take six hours for the same number of men.

"Relative savings were effected also on the exterior and roof sheathing.

"There is practically no waste. . . . Furthermore, it makes a very clean floor for marking off and laying out partitions and cabinet work."

Plywood also prevents any dust, dirt, or cold air from working up from the cellar, and helps to keep the house liveable.

Plywood subflooring should be applied with 8d nails, not more than 6 inches apart at ends and 12 inches elsewhere, with the panel running lengthwise across supports in order that the grain of the face plies will be parallel to the span. Plywood applied this way is considerably stiffer than if laid along the joists.

Plywood subflooring is applied economically because the panels are large (4' x 8') but at the same time light enough to be handled by one man. Moreover, they provide an unbroken working platform during construction for all trades, reduce the accident hazard from falls, stepping on loose planks and the like, and indirectly but noticeably speed erection.

Douglas Fir Plywood as Flooring Base

Plywood subflooring is suitable for various types of finish flooring, whether conventional hardwood or softwood strips, woodblocks, or one of the many resilient materials such as linoleum or rubber tile.

Among the plywood advantages listed for such uses are smoothness; freedom from cupping, warping, squeaking and shrinking; and small number of joints. Plywood is used in both new installations and remodeling jobs.

Use of Plywood as a Subfloor Under Linoleum

by Noel L. Dahlander

Mr. Dahlander is a widely known New York floor consultant and his firm, The Dahlander Flooring Company, specializes in the installation of linoleums and the resilient type of floor coverings.—Editor.

DOUGLAS fir plywood has proven to be a very satisfactory material upon which to lay linoleum or other resilient floors. Its advantages are many. First, let us take up the question of covering old, worn, wooden floors: the common, or old, method of covering this type has been heretofore laborious, dirty, and far from really satisfactory. The method previously used has been to sand or refinish in order to obtain a smooth, true surface on which to lay the floor covering.

By the use of plywood a far better underfloor can be obtained without danger of the old wooden floor warping. The satisfactory method for laying is, of course, to take the largest available sheets that the space permits. Then scribe to fit outer walls or around any obstructions. Butt joints as closely as possible; nail tightly at all joints, spacing nails not more than six inches apart and opposite each other on each sheet. Edge nailing should not be over one inch from the joint. The center of each sheet should be face-nailed on six to eight-inch centers, preferably with a coated or corrugated nail. These nails do not pull and work up like ordinary nails.

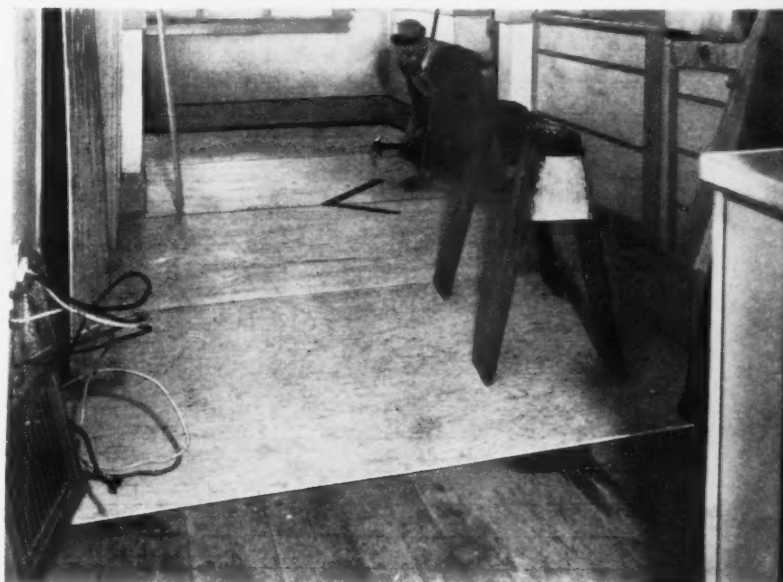
When the sheets have been laid all joints should be thoroughly filled with a good crack filler, forcing the filler carefully between the joints, preferably with a three-inch putty knife. There is a tendency for mechanics to use a trowel for this purpose. A trowel only places a skin coat on the surface, whereas a putty knife forces the material properly between the joints. If a little care is taken in this operation a lot of trouble will be avoided, and a perfect installation will be the result. When the crack filler has dried, probably the following day, all joints should be carefully hand-sanded, using a block of wood.

The block of wood will give the sandpaper the true, flat surface which again finishes the job perfectly.

The economy of using plywood over all worn floors is an issue to be given careful consideration. With the old method of sanding, unless the floor is given a good coat of an expensive sealer, the danger that the wooden floor will warp again is ever present. While the job may be done and passed, quite often months later you will be called back and shown a floor that is nearly as bad as the original old floor, if not as bad.

There is still the danger, even with a sealer, that this may occur. First is the cost of sanding, which is not only an expensive but a dirty job, causing much inconvenience if the house is occupied. Next is the cost of the sealer, plus the cost of labor applying same, and third, it is absolutely necessary to lay a felt lining.

If plywood is used it is unnecessary to use felt. If the plywood is applied properly as before outlined, the surface



OVER old floors plywood panels may be laid as ideal base for linoleum and other resilient flooring.

will be smooth and even, and the plywood itself will act as a good cushion. In fact, even lighter gauge linoleum can be used. We are not, however, recommending the lighter grade unless it is actually a question of dollars and cents. The reason for this is very plain. With the lighter gauge materials there is less wearing surface and shorter life, and having laid a good foundation it is better by far to use the best grade of floor covering, as the life of the material is going to be preserved by having a perfect foundation.

Plywood not only makes a good surface for linoleum, but has decided advantages where asphalt tile, rubber, or similar materials are desired. Owing to the reduction in the number of joints, the surface presented by plywood makes an ideal underflooring.

So much for the old floor.

Use for New Construction Results in Solid Jobs at Cost Savings

Where new construction is involved the use of heavier plywood which takes the place of both the underfloor and the finished floor is, of course, a decided advantage. The underfloor will be smoother, have fewer joints, and a more solid construction. There will be less danger of warping and the floor will be cheaper to lay.

The saving in installation cost alone, in comparison with double flooring, which in all good construction should be expected, will quite often offset the cost of the heavier plywood.

Sheathing with Douglas Fir Plywood

THE ideal sheathing material is strong and rigid, air-tight, rugged without excessive weight, split-proof, easily nailed and worked, yet quickly and economically applied.

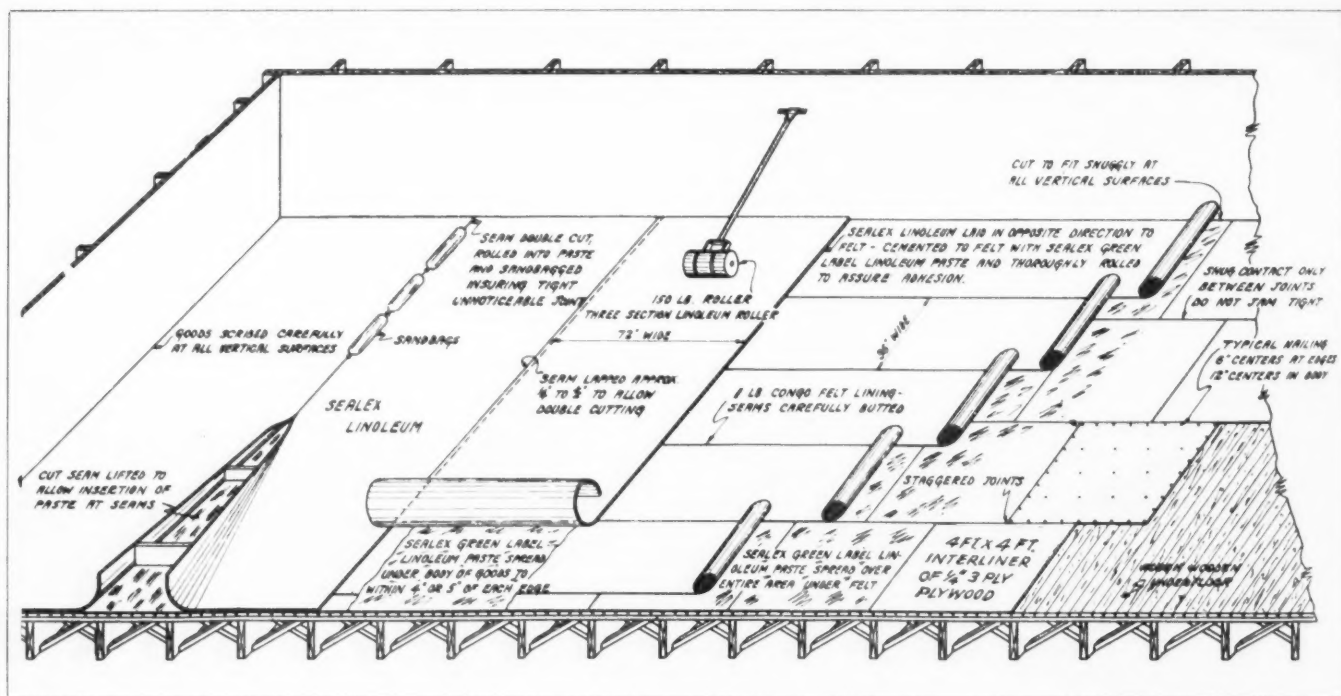
Fir plywood, 5/16-inch thick, in the "Sheathing" grade fulfills all these conditions. Tests at the U. S. Forest Products Laboratory, foremost authority of its kind, have demonstrated that 1/4-inch, and hence to a still greater degree 5/16-inch, fir plywood sheathing makes a frame wall 40 percent more rigid than conventional diagonal sheathing or let-in braces; nearly four (4) times as rigid as cut-in bracing; and nearly six (6) times as rigid as horizontal sheathing.

Further series of tests at Portland, Oregon, and Detroit, Michigan, as well as hundreds of job experiences, have substantiated the government laboratory figures.

The large conventional panels, 4' wide by 8' long, have few joints and if laid vertically even these few will be backed up by a solid stud or plate. Plywood sheathing, therefore, is practically air-tight and hence requires no building paper to help exclude the chill blasts of winter.

Plywood is made of solid wood layers and hence is not porous enough to be classed as an insulating board. Nevertheless, although impervious to winds, plywood does possess thermal insulating properties and has a conductivity of 0.78, the same as Douglas fir lumber.

A wall sheathed with fir plywood, then furred and covered with wood siding and paneled on interior with 1/4-inch plywood, has an even better insulating value than



SPECIFICATIONS FOR INSTALLATION OF PLYWOOD AS AN UNDERLAY FOR SEALEX LINOLEUM OVER UNEVEN WOODEN UNDERFLOORS

Where a wooden underfloor is uneven, splintered or rough, due to wear, it shall be levelled out through the use of 1/4" Douglas fir plywood of the wallboard grade.

The sheets shall be not larger than 4'x4' and they shall be so laid that vertical joints will be staggered. Each sheet, as it is laid over the uneven wooden floor, shall be nailed 6" on centers at all four edges and 12" on centers through the body. Succeeding sheets

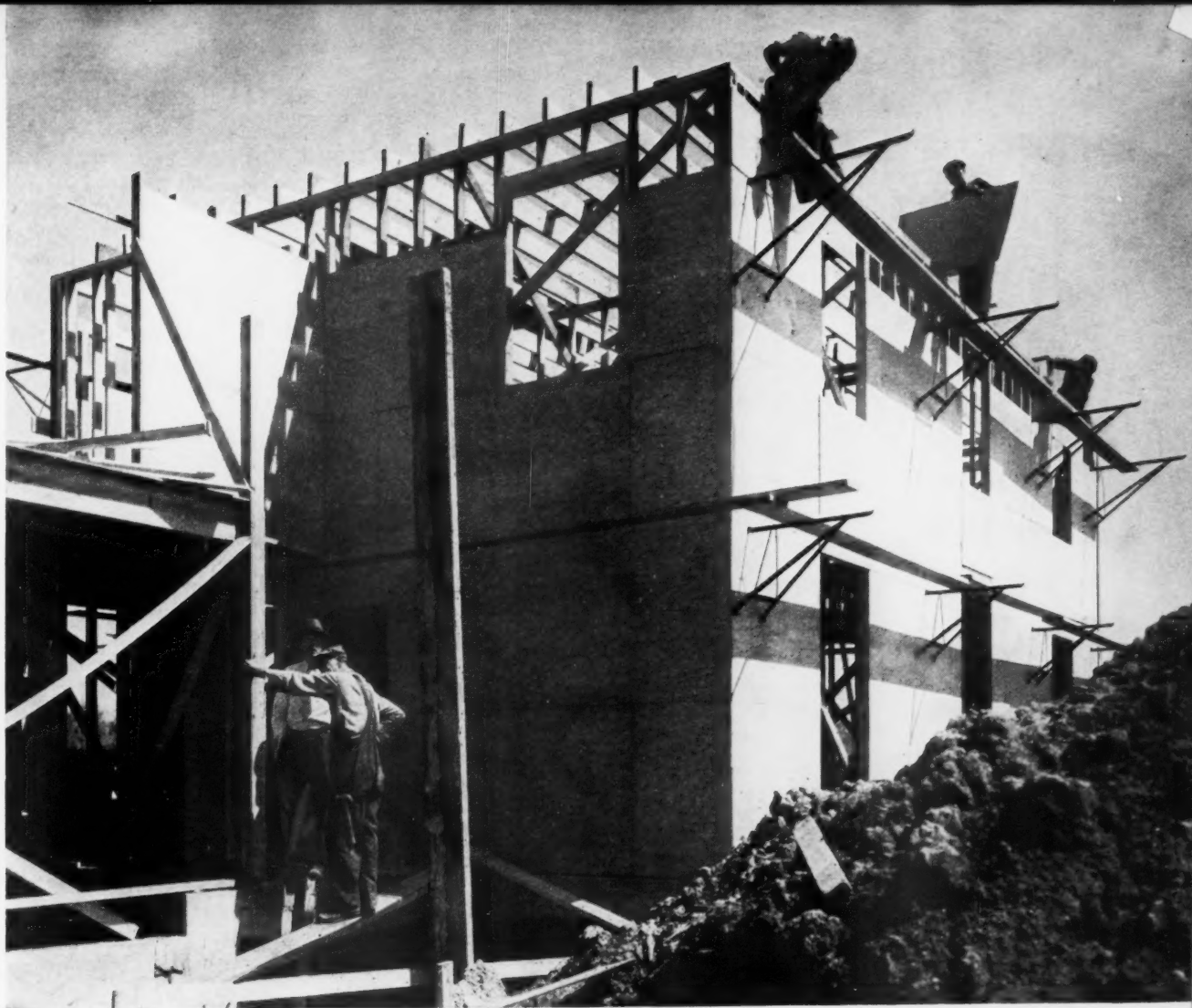
shall have snug contact only at the joints and shall not be driven tight. At all vertical surfaces the Plywood shall be cut to fit neatly, leaving not more than 1/8" opening at any point.

After the plywood has thus been laid over the entire area, 1 lb. dry lining felt shall be installed over the entire area, using Sealex Green Label Paste to secure it to the plywood. Over this the linoleum as specified shall be installed, using Green Label Paste to cement it to the felt. The sheets of the linoleum, as they are laid, shall be run in the opposite direction to the felt.

The felt and the linoleum shall be installed in accordance with the manufacturer's specifications.

5/16" Douglas fir plywood sheathing for suburban residence in Winnetka, Ill.—One-man panels speed construction.

PHOTO below shows plywood roof sheathing as base for wood shingles, double coursed for shadow lines.



"Standard Frame" construction which has stood since early Colonial days for a comfortable and satisfactory type.

To the builder and contractor, the other advantages, such as workability, split-proofness, and ruggedness under severe handling, are less important than that of economy. The 5/16-inch utility or Sheathing grade of fir plywood compares favorably in price with conventional materials which are necessarily thicker and heavier.

Freight and other transportation costs naturally favor a thinner, lighter material.

Plywood's chief advantage, however, lies in its low cost of handling and applying. The stock 4' x 8' panels, 5/16-inch thick weigh only about 30 pounds—a convenient one-man size—and with 32 square feet at a time going into place, it is easy to see why builders claim tremendous savings. In addition, plywood requires fewer and smaller nails. Location of openings, of course, affect the amount of cutting but savings of 40 to 50 per cent seem conservative for plywood sheathing; and some builders claim they can cut their labor to about one-third.

Application

5/16-inch plywood sheathing is applied with 6d nails, not more than 6 inches on centers at edges and 12 inches on intermediate studs. Such nailing develops a high percentage of the panel's strength and removes the necessity for diagonal bracing when fir plywood sheathing is used. In fact, at the Fifteenth Annual Pacific Coast Building Officials Conference, held October, 1937, at Los Angeles, plywood sheathing 5/16-inch thick was given approval (tentative for one year, as required under Conference by-laws) and angle bracing was eliminated.

Builders apply the panels both vertically and hori-

zontally on the walls, although the latter is slightly better from a structural standpoint.

Plywood sheathing is suitable as a base for conventional exteriors of either siding or shingles, or of masonry veneer. Wood siding is nailed through the plywood to the studding. Some prefer to use vertical furring strips over the plywood at each stud, thus creating an air space and extra insulation between siding and sheathing.

As a base for wood shingles, 5/16-inch plywood has been tested and approved by such an eminent authority



as Prof. Bror Grondal, University of Washington, and special consultant for the Red Cedar Shingle Bureau.

In the tests, it took a minimum of 85 lbs. to pull an 8 inch shingle, one of a panel, from 5/16" plywood. Tests on other conventional bases showed the same minimum and only slightly higher averages.

Eighty-five pounds on an 8" shingle, with 5" to weather is equivalent to a wind load of nearly 300 lbs. per sq. ft., enough force to blow any building in the world off its foundation.

The reason for this somewhat surprising characteristic of fir plywood is that the ultimate failure is due to the nail heads pulling through the shingles before the nails can be pulled from the 5/16" plywood.

Roof Sheathing

Stiffness or deflection resistance is a factor in roof sheathing, the amount needed depending upon snow loads, and other live loads and rafter spacing.

The proper thickness of fir plywood sheathing to use may vary from 5/16 inch for rafters 18" apart, and roof loads not exceeding 20 lbs. per sq. ft., to 3/8" sheathing for 20" spacing and 30 pound loading, and up to 5/8" sheathing for 30 inch spacing and 30 pound loading. Details for computing proper thicknesses are given in the guide at the rear of this Handbook.

Paneling

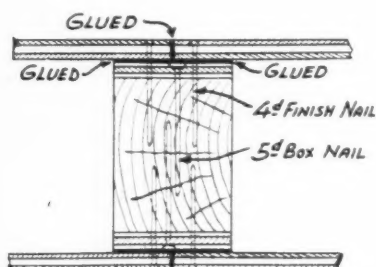
Walls of Douglas fir plywood are suitable to almost any type of home—from the simple cottage to the costly manor. Its adaptation to structures other than homes is only a matter of selection from the wide range of decorative possibilities. Any room to be sealed, whether in a home, store, office, or school, may be tastefully finished with fir plywood. Its flexibility means limitless opportunities for the development of any decorative finish.

While fir plywood walls obviously are suitable as a base for wallpaper and other covering, stained or painted decorative treatments have contributed most to plywood's popularity.

Because of the simplicity of its installation and fundamental low cost, fir plywood is suited to the production of economical walls—especially for modern interiors featuring large unbroken areas, horizontal mouldings, curved wall surfaces, or vertical paneling effects. For "period" interiors the fact that plywood is wood—the basic material of original "period" treatments—requires its use in order to provide authority for the furnishings to follow.

Flush Joints With Plywood

As a further contribution to the value of dry wall construction, the technique or system of making invisible, crack-proof flush joints with furstix, or glue strips, as they are called sometimes, makes possible unlimited areas of walls and ceilings unbroken by mouldings or joint details.



DETAIL of flush joint between plywood panels reinforced with glued-on strip at the back.

This system is simply an adaptation of the plywood principle of gluing wood at right angles. Strips of plywood 2 1/2 x 1/4 inch which have been cut across the grain, are nailed to all studding, rafters and headers. Next, the strips are coated with a commercial casein glue and the plywood panels lightly nailed to the plywood strips so as to provide pressure until the glue sets. The panel edges are drawn up tightly with as small a crack as possible. This small crack is filled with plastic wood or Swedish putty and then the wall is ready for decoration.

Paneled Walls and Ceilings No Longer a Luxury

Fir plywood, aside from its decorative character, is surprisingly easy to work into interesting and authoritative panel treatments. The architect and owner will be concerned particularly with the effect to be achieved, and these effects are practically numberless, limited only by the mouldings applied in combination with the stained, painted, or covered decoration. The contractor or carpenter is more concerned with the practical application and efficient method of producing permanent, satisfactory work with a minimum of labor.

Joints

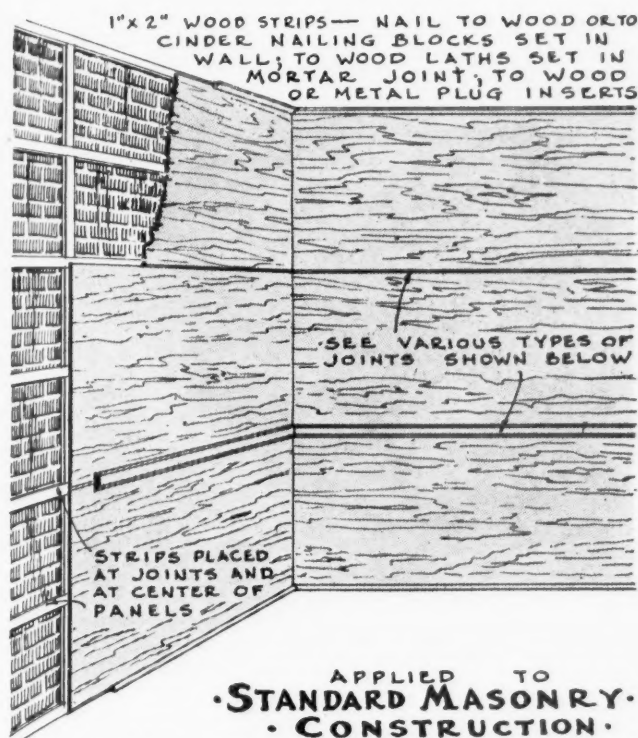
In the drawing there appears representative details for cornices, bases, and joint treatments. Joint E is the same as described above under the name of furstix and is an excellent joint to use even though it is to be covered with a moulding strip. At some future date the owner may prefer an invisible flush joint without moulded panels for all-over stain, paint or wallpaper, in which case only the mouldings need to be removed and the nail holes filled. Joint D is the simplest and most economical treatment. The frank recognition of the joint line may be capitalized upon to designate desired panel arrangement. The plywood panel edges are simply chamfered by a hand or power plane. The slight cracks in the V joints which may result from frame movement are concealed in the shadow-line produced in the V. False V joints may be worked elsewhere in the panels to accomplish completely any desired panel arrangement. Such false joints may be worked with sharp hand tools or power routers. Joint C may be varied, using any of the narrow mouldings such as screen moulds or any specially milled strip. Care, however, should be exercised so that the width of the inserted strip does not require too wide a nailing base and prevent secure nailing of the plywood panels.

Modern treatments may be accomplished successfully and economically by the use of metal mouldings and garnishes, the use of which should follow manufacturers' directions. Metal decoration contrasting with plywood only accentuates the inherent charm of the natural wood and the experienced craftsman may accomplish striking effects.

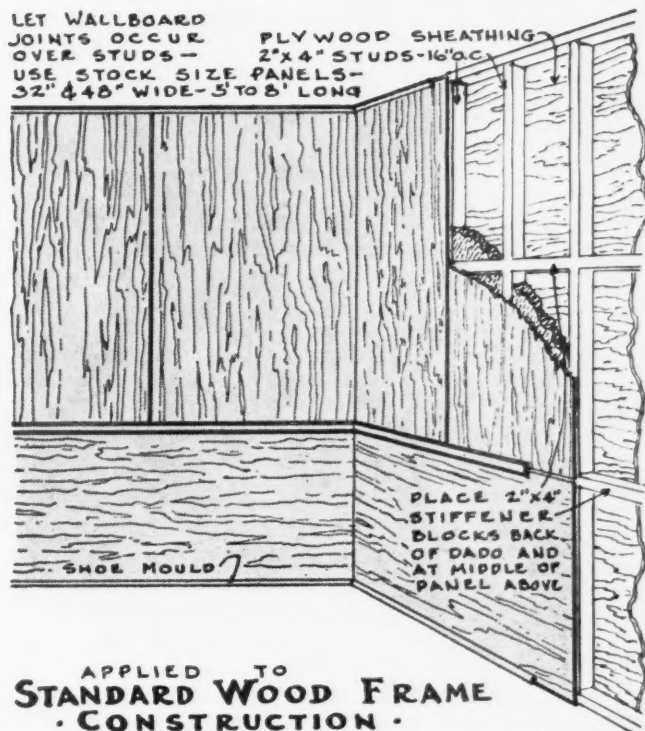
Cost of Plywood Finish

As labor costs vary in different communities and retail material prices vary according to freight rates and other factors, it is difficult to estimate plywood paneling costs accurately. However, as a matter of comparison with other materials, plywood walls are fundamentally low in cost. An example from a typical market may serve as a basis for rough estimating: If lath and plaster is figured at \$1.00 per yard, a room 14' x 20' with 8' 6" ceiling (contains 578 sq. ft. wall area) would cost \$64.10 for plaster and is ready for decoration after

Plywood Fits Into Any Type of New Construction---

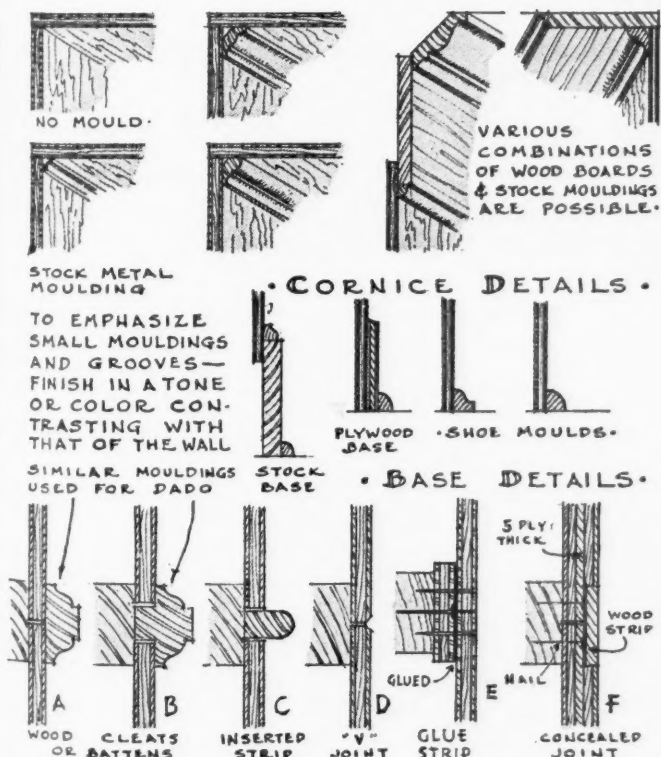


ARRANGE PANELS TO AVOID UNNECESSARY CUTTING AROUND WINDOWS & DOORS

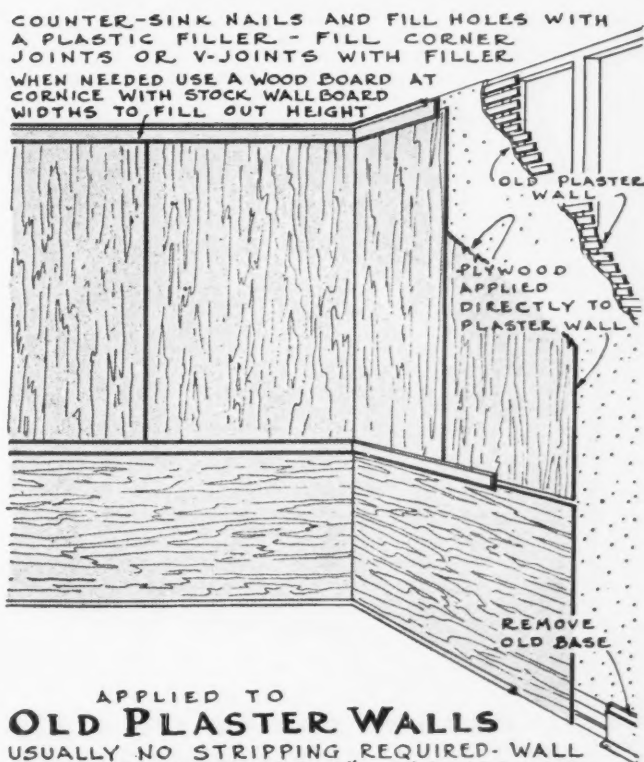


(PAINT BACKS OF PANELS WITH PRIMING COAT OF LEAD & OIL BEFORE PLACING)

---Gives New Beauty to Old Plaster Walls



VARIOUS JOINT TREATMENTS

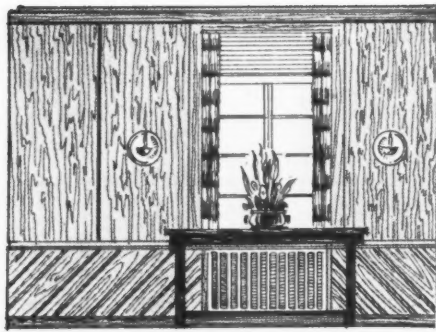


APPLIED TO OLD PLASTER WALLS

USUALLY NO STRIPPING REQUIRED—WALL BEHIND PLASTER HAS 2"x4" STUDS OR FURRING STRIPS SPACED 16" O.C.

INTERIOR WALL DESIGNS USING PLYWOOD WALLBOARD WILL BE FOUND ON NEXT PAGE

DETAILS of Douglas fir plywood use for wall linings, showing dry wall technique, with various methods of forming the joint between panels.



Vertical Plywood sheets with diagonal wainscot

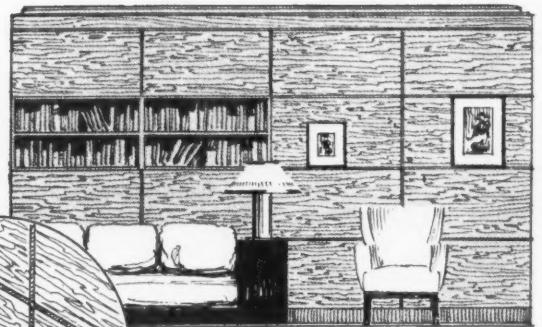


Mixed horizontal and vertical sheets of Plywood

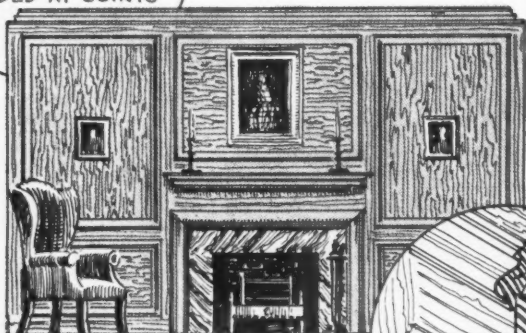


NO. 7135
WAINSCOT
PLYWOOD
EDGES
SANDED AT JOINTS

Vertical Plywood panels with horizontal wainscot

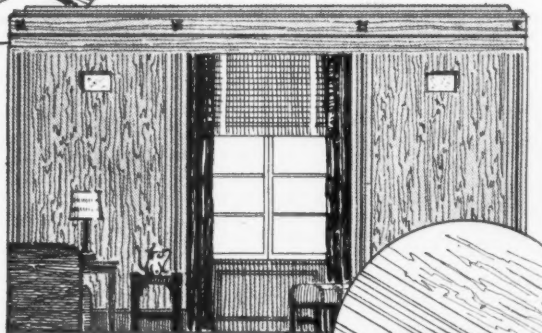


Horizontal Plywood in small sheets with "V" grooved design

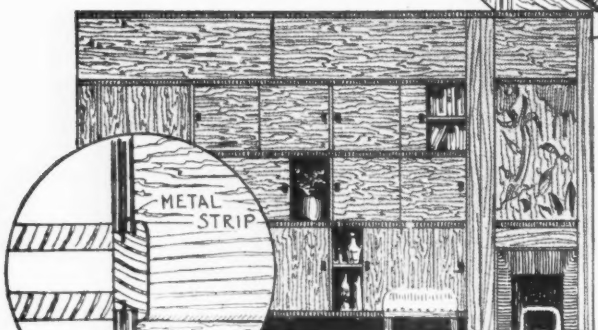


Plywood sheets used as large flat panels---with rails and moulding

V-GROOVE
JOINTS
CUT WITH
PLANE OR
GROOVING
TOOL



Long Plywood sheets with pilasters



METAL
STRIP
SLIDING PANELS
OF PLYWOOD

Sliding Plywood doors

MOULDING
NO. 7145

PLYWOOD
WALL-
BOARD

FLUTED PILASTER
AT WINDOW
AND CORNER



Vertical Plywood on curved walls

EIGHT attractive decorative schemes for paneled interiors constructed of Douglas fir plywood. Note inserted details to larger size indicating good construction practice. Plywood is a versatile material for uses of this kind, and numerous attractive surfaces are produced to give beautiful and harmonious effects.

drying. The same room may be covered with plywood retailing at .05c per foot, installation cost .04c per foot, for \$52.02, and is *ready immediately* for decoration. Decoration costs are comparable with both types.

Correct Application of Plywood Ceilings

Ceilings provide an opportunity for interesting and distinctive treatment with panels of Douglas fir plywood. Ceilings of permanent safety may be constructed as the crowning glory of rooms, with the stable, sag-proof, crack-proof, and economical Wallboard grade.

Fir plywood is a high-quality building material and, therefore, should receive the same considerate treatment accorded materials of greater cost. The panels are delivered on the job straight and true with a moisture content equal to the moisture content normally found in interiors. It should be piled flat in a dry place with edges even and protected from weather and abrasion.

In doing a job the first step is to lay out the panel scheme. If the ceiling is to be done with moulding or beam treatment proper nailing bases must be provided. The variety of panel arrangement is quite wide and will be determined largely by the decorative effect desired. A primary point to be borne in mind is the fact that narrow rooms may be made to appear wider and, vice-versa, with arrangement of panels.

Nailing surface, whether over old plaster, or direct to joists and headers, must be level to provide flat backing.

Headers or nailing pieces must be inserted between joists on new work so that the panels may be nailed all around—both sides and ends. Over old plaster if furring strips are used, cross strips should be provided for edge nailing. Normally, however, plywood is used over old plaster without any furring. A solid and level foundation for panel edges is paramount. Of course, furring strips over old plaster will be nailed at right angles to the joists. Loose plaster should be removed but it is not necessary to break away solid portions, as the furring strips may be shimmed out with shingles or wedges.

Correct nailing is important. It is common practice to start the first panel in the middle of the ceiling and work both ways to assure symmetry. 4d finish nails are used and spaced about 8 inches apart on the panel edges and face nailing is necessary on very wide and long panels, 24 inch spacings for face nailings being adequate for ordinary conditions. For unusual humidity or temperature conditions it is advisable to back-prime the larger panels, and if this is done the faces should be sealed shortly thereafter. Face nails and any exposed edge nails should be sunk with nail-set and holes filled with plastic wood or suitable crack-filler.

Moulding choice and arrangement offer wide variety.

Beams may be covered with the plywood and false beams constructed to balance, or steel beams and columns can be covered with fir plywood to match the fir plywood ceiling panels and sidewalls.

Finishing of Douglas Fir Plywood

For Cabinet Work and Dry Wall Construction

THE advantages of Douglas fir plywood—its structural strength, beauty of figured grain, the wide variety of thicknesses and sizes, as well as its relatively low cost—have made it a product of great general utility in all building construction, especially for cabinet and millwork and for walls and partitions.

There is a keen desire on the part of building contractors and all manufacturers of building equipment to avail themselves of these fir plywood qualities, and, consequently, every effort is being made to extend its use into fields previously filled by other woods, including hardwoods. Now, practically all wooden products—no matter how used—need a decorative finish or protective coating. This finishing of virtually every species of wood is a problem unto itself, and fir plywood is no exception to this rule. In fact, fir, because of the character of its growth has presented some unique problems. The very beauty of figured grain which has been one of the contributing factors in extending the merits of fir plywood has, itself, presented some finishing problems. This highly figured wood naturally has a great variety of hard and soft grain, and when certain stains and finishes are applied the grain is accentuated or raised.

There are two general classifications into which a discussion of finishing fir plywood falls:

1) Where the plywood is to be used with the grain showing, as for instance with stains, clear finishes, etc., as in all types of cabinet work, paneling, wainscoting, furniture, many types of built-ins, doors, etc.; and

2) As in dry wall construction where the plywood

is decorated either with these same finishing materials, or where a wall simulating the ordinary plaster or painted wall is desired, in which case the plywood surface is completely covered.

For Cabinet Work

Many of the liquids, thinners, and solvents used in ordinary paints, lacquers, and stains have the effect on the soft grain of this as other woods, of raising or accentuating the grain. Alcohol, acetone, and some lacquer thinners are especially noted for this. In the case of paints, this requires a considerable number of coats to be applied (with hand sanding between coats) in order to produce a smooth high quality finish. The pigment in the paint has the tendency of piling up on the springwood, i.e., the softer light colored grain. With stains, there is presented the finishing problem of having these materials strike deeply into the soft grain and coloring it darker or more intensely than the hard grain. With some light colored stains this is not undesirable, but where dark colored water, oil, and spirit stains are used it becomes very difficult to obtain a uniformly attractive color and finish.

Various types of sealers and primers have been used to equalize the surface before applying undercoats and finish coats. However, they have their limitations. A considerable advance has been made by the discovery that synthetic resins in special vehicles could be used to impregnate the surface of the fir plywood and alter the surface conditions so that finishing becomes much easier.

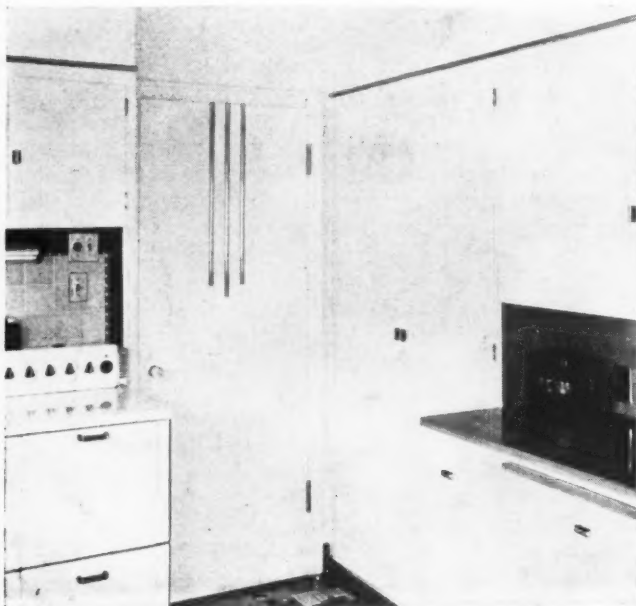
Such a treatment is being applied at the factory by the fir plywood manufacturers and is called "Reziting." It is applied immediately after sanding and prevents the grain from raising due to moisture. Because of its light color it does not materially affect the appearance of the plywood so that all finishes, paints, and stains may be applied without grain raising and without the usual contrasts customary in untreated fir. This treatment, by preventing moisture absorption, also reduces the tendency of the wood to check.

This same type of priming material is generally available throughout the United States for use by the painter or in the finishing plant and is being used by a great number of millwork and cabinet shops as a treatment for fir prior to applying stains, paints, enamels, lacquers, etc. In many instances it is applied to the fir plywood with a saturated rag which method is not only quick but economical and effective. Prior to applying a primer, it is necessary to sand the surface of the plywood using sharp sandpaper which will cut evenly through the hard as well as soft grain. Too fine a sandpaper only works on the soft grain and often produces a wavy appearance when the plywood is painted. It dries quickly, and before applying stains or paints it is customary to touch up the surface lightly with fine sandpaper—then any of the regular finishes can be applied, including water, oil, and spirit stains.

In staining, the effect that is obtained is very similar to that on hardwoods, the only requirement being that the stains must be allowed to stand longer than when applied over an untreated wood surface. When oil stains are used, the operation is more that of glazing, and the stains in general must be heavier bodied than when used over untreated or raw wood. The result is so unusual to fir that in many places stained fir panels can be used where only hardwoods were previously considered suitable. This is particularly true on cabinets, doors, and wall panels. This treatment, acting as a sealer and primer, usually saves a coat of paint and, in general, the results are superior to those obtained over other softwoods.

Decoration of Dry Wall Construction

The development of dry wall construction which has opened up a tremendous new field for the use of large



FLUSH doors of Douglas fir plywood painted with semi-gloss paint give a note of cleanliness and efficiency to this kitchen.

fir plywood panels has proposed the new problem for finishing. Heretofore when plaster was used, the finishing of all woodwork, including fir panels used in built-in fixtures, cabinets, etc., was a serious problem because of the great amount of moisture present in the house. With this new type of dry wall construction this difficulty is eliminated. These large fir plywood panels are nailed or glued to the studding (in many cases being prefabricated in the shop) and call for many different types of joint treatment, i.e., between panels. This has been solved in various ways with the use of battens, mouldings, etc.

In general, however, the desire to obtain a one-piece wall at a low cost which will have all the appearance of a plastered wall, at the same time meeting the requirements of the prospective owner or architect for decorative effect, places upon the contractor new responsibilities.

Where a one-piece wall has been obtained by gluing the panels or wall sections in place, the use of Swedish putty or special joint fillers is required to first even up the surface at the joint. Experience has shown, however, that while skilled mechanics can, if given sufficient time, produce a flawless wall, the general result is that there are certain differences in the plane of the surface and that when the joints are touched up and the wall painted with paint or enamel these slight imperfections are accentuated, particularly when the light falls upon the wall from a certain angle. In order to overcome this, stippling and the use of plastic paints has been used.

When plastic paints are used, it is, of course, necessary to prime the wood surface first, unless the plywood has been factory primed, otherwise the application of a water product to the wall will raise the grain and, also, unless joint fillers are primed, the joints might also be affected.

A new material which is synthetic resin bound and which comes in paste form and is thinned with turpentine or paint thinner, is being offered for the decorative treatment of such walls. It does not produce an absolutely smooth finish. At the same time it is not rough, having just enough relief similar to a wall plastered with fine sand finish plaster. This coating has sufficient elasticity to prevent checking due to extremes in temperature. This is a one-coat material, is applied with a brush, and can be put on over the factory treated "Rezited" plywood quickly, as it dries overnight, and enables the painter to decorate the walls with whatever materials he wishes to use; either oil or casein paint—even wallpaper. This treatment is quicker and less expensive than canvassing or other types of treatment; also it has the advantage of the appearance of a plastered wall, and, most important, it supplies a coating of sufficient thickness and character so that the finished wall is conventional and attractive in appearance and utility in every respect.

* * *

Storage

THE matter of properly warehousing Douglas fir plywood in comparatively small quantities deserves consideration.

Principal requisites of proper panel storage are that panels should be kept inside under cover; they should be piled flat to avoid inducing a permanent warp. (panels should not be stored on edge); they should be piled evenly, one panel directly above the other to prevent damage to projecting edges from mechanical injury or fading from light; each pile should be covered with canvas, paper, or a "cover panel" to keep the top panel free from dust and in good condition.

The same general rules for proper storage apply after delivery to the job as well. The facilities for proper handling at this point are usually very poor, but provision should be made to pile the panels flat and to protect them from rain or strong sunshine.

Hanging Wallpaper Over Plywood

By Burr Gregory

Burr Gregory Wallpaper & Paint Company

THE wide increase of the use of wallpaper brings forcibly to the attention of the wallpaper man the need for more careful planning on the part of builders to provide a satisfactory surface for paper.

A base for wallpaper which has rapidly gained favor in recent years is Douglas fir plywood. This is due to the fact that it presents a smooth surface with a minimum of joints and because experience has shown that it does not, like many other boards, expand and contract so that the paper cracks over the joints. This quality of plywood is of increasing importance because of the modern decorating trend towards smooth walls unbroken by battens or panel strips.

I have been recommending fir plywood for use under wallpaper for some time and have had an opportunity to check numerous finished jobs, and I have yet to find one that has cracked at the joints.

While it is possible to apply paper directly to the plywood a more satisfactory job is obtained by first applying a lightweight felt paper. We usually recommend three-quarter pound felt. The desirability of felt is especially noteworthy when hanging plain papers; otherwise, irregularities of the surface may show through.

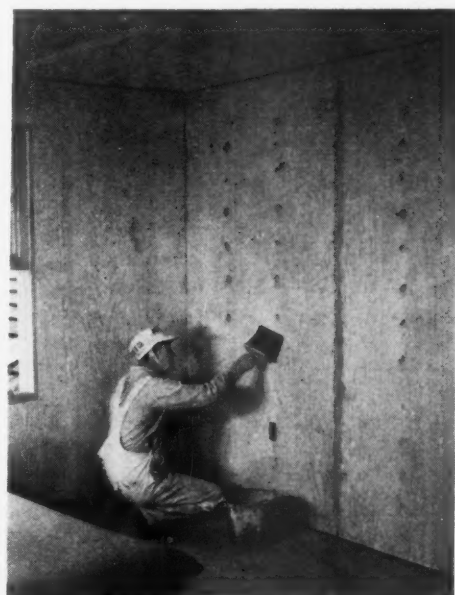
This felt is inexpensive and can be applied with ordinary wallpaper paste. Of course, the felt should be butted at the joints so that the surface will be entirely smooth. It is advisable to let the felt ceiling strips run down about one inch on the sidewall. Then, when the felt is applied to the sidewall it should extend to the ceiling, lapping over the one inch that was allowed to drop from the ceiling joint, and since there is always either a moulding or band border at this point this lap will be entirely covered. The felt paper has an added advantage of acting as an efficient sound deadener and insulator against thermal conductivity.

A situation which is sometimes encountered is one in

which paper is wanted in a room where the surfaces are plastered and the plaster is cracked or falling off. Here plywood offers the quickest and best solution. The plywood is put on the plastered area, thus preventing further falling away of the plaster and providing the necessary smooth surface for the wallpaper.

We find that the advent of plywood has enabled customers to use wallpaper in numerous houses which otherwise, of necessity, would have been stained or painted. Since modern wallpaper gives such a splendid opportunity to decorate each room in keeping with its use, fir plywood is highly regarded by wallpaper men and their customers.

SIZING the plywood with wallpaper paste before hanging the felt assures better adhesion. Joints and nail holes are filled with crack filler and smoothed with a sandpaper block.



THE straight-edge felt is tightly butted, thereby providing an absolutely smooth surface for the paper.



UNIFORM adhesion of the felt to the plywood is assured by going over it carefully with the smoothing brush.



EXPERIENCED paper hangers prefer felt and Douglas fir plywood as a crackproof base for wallpaper.

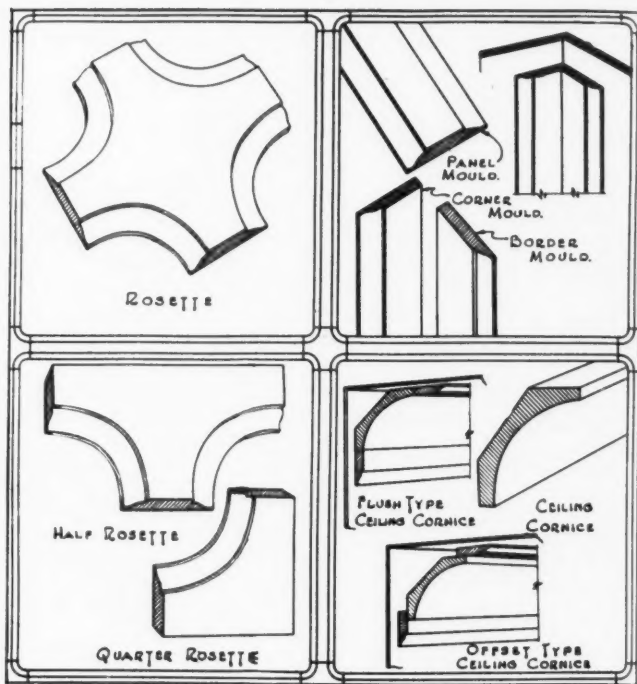
Special Face Textures and Decorative Systems

DISTINGUISHED textures and groovings manufactured into the face veneers of Douglas fir plywood wall panels widen the choice range from the plywood dealer's stock.

Apart from the mere choice of panel arrangement, joint detail, and decorative finish, is the supplementary mill refinement of the plywood surface texture which also freely admits of further staining, glazing, multi-tone painting, etc.

One highly individualized texture provided by special mill treatment is an all-over rustic working of the panel facings. This texture is accomplished by etching away the light-colored and softer spring wood of the grain so as to leave the darker and somewhat harder summer wood in bold relief. This relief pattern is as varied and interesting as is the unusual character of Douglas fir natural grain, and in the hands of the finisher it imparts a surface suggesting the vagaries of the primeval. This specially-textured fir plywood is available in standard sizes of Wallboard grade and is proving immensely popular for the construction of false beams and featured paneling in recreation and game rooms, taverns, cabins, offices, lobbies, and wherever custom styling is important.

Another special texture being manufactured into the panel faces has so captured the imagination of creative decorators that they appear to be developing a vogue with it. This new specialty is a wall and ceiling plywood treated with an exclusive graining process that alters the characteristic appearance of the rotary-cut veneer, and imposes a smooth, even and refined grain pattern. This artificial grain is part of the wood and is as permanent as the wood itself. This product of the woodcrafters' skill requires no battens or mouldings to conceal joints. All panel edges are rabbeted so that when two panels are



MANY kinds of designs and size of paneling can be obtained by using mouldings of this type.

butted together, the joints become part of the tooled design. All panels are mill-treated with a resin sealer. These pre-finished panels are available in standard wall panels; 48" wide x 8', 9', 10', and 12' long; and 48" x 48" ceiling panels.

Another individualized wall paneling which brings a new mode of interior finish within the price range of the average decorator's budget and introduces an artistry suggestive of inlay and parquetry, is Douglas fir plywood panels employing various patterns of inlaid flush mouldings. Panel edges are rabbeted and joined with an ingenious method of using its own pattern to cover the joints. Joints are not only completely concealed, but actually contribute to the decorative scheme by breaking up plain surfaces into attractive decorative panels. These factory inlaid panels are available in four distinctive patterns, each of which is susceptible to all of the decorative finishes which may be applied to wood. For further variety, the patterns may be combined because, like the natural wood of which it is made, each has a basic note that blends with another, and produces a perfect harmony of effect. It is easy to apply on new or old work. It is stocked in standard sheets 48" x 96" and is accompanied with trimming mouldings.

Supplementary to the standard Wallboard grade of Douglas fir plywood and to the specialized wall panels, all of which employ rotary-cut veneers, there is yet another type of facing which adds still greater variety to the choice range—namely, edge grain or sliced veneer facings applied to standard panels. Replacing the interesting, if somewhat vivid, moire-like pattern of regular slash grain Douglas fir is the more restrained character of the uniformly colored parallel lines, alternately dark and light. These faces, applied to strong, warp-proof, split-proof plywood make a long-sought material available to the decorator and craftsman with which to achieve certain permanent effects heretofore unobtainable except at the expense of excessive bulk or the risk of fragility.

Only careful planning, not mere enthusiasms or happy

RUSTIC finished panels with narrow mouldings of light, smooth finish to accentuate the etched surface of plywood and to emphasize horizontal lines.





ABOVE is photograph of a distinguished living room paneled entirely with a special fir plywood. Finish, one coat enamel undercoater paint, one coat thin clear lacquer.

accident, can be relied upon to create decorative effects that serve the uses of gracious living. To remove the tediums and hazards from planning, a specialty moulding system, consisting of linear strips and junctions, tastefully and skillfully designed is available from dealers' stocks.

The linear moulding strips consist of gracefully designed panel mould, corner mould, and border mould which, when used with full rosettes, halves, and quarters, constitute a simple and dignified system for panel delineation.

The moulds may be used in conjunction with other standard mouldings. For example, the corner and border moulds, when used with standard coves, produce either flush type or offset cornices of unusual effectiveness. These specialty mouldings are inexpensive, more efficient, and quite as decorative as higher priced frame paneling.

Special panel crafting obtained by slight charring by blow torch, sand blasting, wire-brushing, and other mechanical means of altering surface texture, is done in the shop or on the job. Carving with hand chisels or power routers is sometimes resorted to in order to add variety. Briefly almost any treatment applicable to solid wood may be adapted to Douglas fir plywood.

The flexibility of plywood paneling means limitless opportunity for the expression of any period or architectural theme. Period—sharply modern, formal, informal, quaint, or austere—whatever the requirement for any distinctive home or business interior—walls of Douglas fir plywood are indicated because, with it, any shade of interior effect is obtainable and within reasonable cost range. With plywood, walls may be built which somehow just "fit," not only the tone of the surroundings, but also

BELOW is an Empire period wall treatment made of Douglas fir plywood grooved into a diamond pattern with a high speed electric hand router to cut through the surface veneer. Many such effects are easily obtainable.



the economic status of the structure. Worked with hand or power tools, plywood responds to the craftsman's skill. So: walls, decorative features, doors, and utilities may be tailored and personalized to fit the individuality of the owner. In one of the wall treatments photographed a foundation suggesting the formal "Empire" period was desired and, accordingly, panels of standard Wallboard grade of Douglas fir plywood were placed on a flat bench and marked off with a diamond-shaped pattern above the wainscot line and vertical groovings below, typical of the dominating decorative pattern of the period. Straight-edge guides, waxed to remove friction, were clamped into place, and with a high-speed electric hand router (readily available) the V-shaped grooves were cut to the depth of the face veneer. The routed panels were nailed into position on the studs and trimmed in keeping with the theme. The star-shaped medallions on the frieze were jig-sawed from plywood. After painting with semi-gloss in white and smoke-blue, the metal stars were nailed into position. Light fixtures and rich drapes are accentuating appointments.

In the same way, a Marine motif, required as the backdrop for an informal hobby room of a man who chose to use the spirit of the sea as atmosphere for his trophies, was easily produced. With fir plywood the idea was readily accomplished by simulating random vertical panels with slightly rounded grooves worked on a small table saw with dado attachment. Anchor-shaped appliques at the ceiling band were cut with a coping saw. A heavy Manilla rope was nailed into place to serve as picture mould. A "port hole" was cut with key-hole saw and a lighted shadow-box formed a niche for a treasured model. Paint completed the effect.

Cabinet Work of Plywood

By minimizing piecing, and fitting, Douglas fir plywood's large size greatly reduces the cost of all kinds of casework, besides giving it split-proof, warp-resistant strength. Plywood's crossbanded construction eliminates swelling and shrinking and so cabinet drawers, bins, and doors made of it will never stick, and the joints will

remain permanently tight and dust-proof. Shelving, nooks, and built-ins may be made with thinner pieces and plywood's strength capitalized upon to accomplish more graceful and appealing lines. Strength is an important feature in creating a preference for plywood breakfast room sets, sleeping bunks, ironing boards, window seats, and similar features calling for stability and shock resistance. The ease with which large pieces may be worked with hand or power tools and its affinity for glues also make fir plywood a popular cabinet shop material. Nails or screws may be placed closely to the edges of the panels without splitting.

Built-ins Favored

The modern trend in design and construction has less regard for the "conventional" aspect and the form of things depends largely upon their practical function. Hence, home builders are given greater latitude with regard to the construction of conveniences and to attractive features which contribute to today's mode of living.

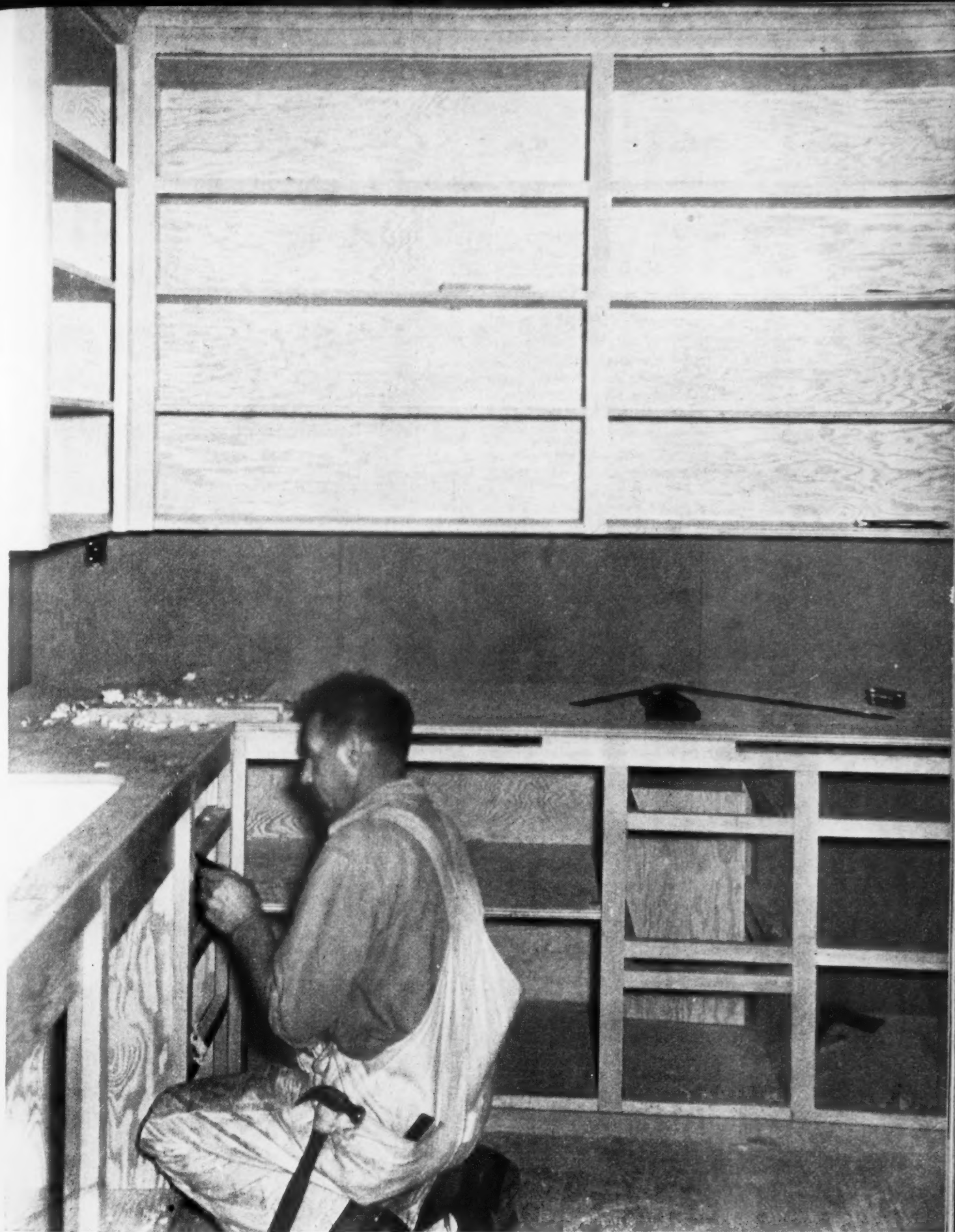
Fold-away items, such as, breakfast room sets, cabinets, bars, and game tables are popular for floor-space in a modern home and serve a variety of usefulness; thus, the trade is called upon to exercise a greater degree of skill than heretofore. Plywood's characteristics are ready-made for such demands and have contributed no small part in developing the taste and appreciation of such items.

Among the various grades of Douglas fir plywood used in construction, the most popular in cabinet work is Wallboard of 3 or 5-ply which is available in thicknesses, sanded, $\frac{1}{4}$ -inch and $\frac{3}{8}$ -inch, 3-ply; or $\frac{1}{2}$ -inch, 5-ply. The panel faces of this grade are smooth and suitable for painting while the backs may contain blemishes unsuitable for exposure on good work. When both sides of the panels are to be finished for exposure a GOOD 2 SIDES grade should be used for natural or stain finishes, or SOUND 2 SIDES grade if the plywood is to be painted.

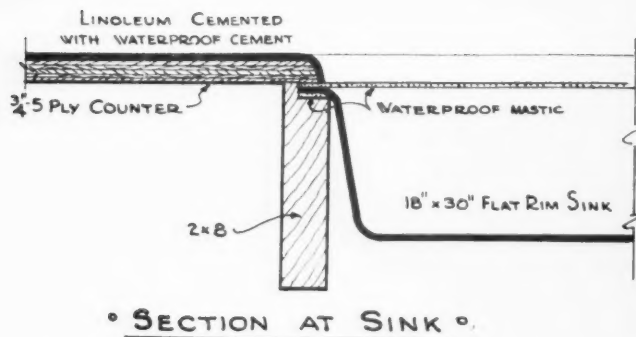
In the photograph opposite (1) fir plywood is in evi-



AN artistic modern use of fir plywood built-ins and interior paneling to frame nature's beauties.—Beatty and Strang, Madison, Wis., architects, use plywood effectively for cabinets and shelving.



FIR plywood's adaptability makes it popular for varied construction uses. Carpenters like this strong, straight material which permits them to do a good job quickly. Fixtures in this kitchen illustrated will express the latest in modern style.



PLYWOOD work counter top used by many builders and recommended by a prominent lumber manufacturer for its series of 1938 demonstration homes; $\frac{3}{4}$ " Douglas fir plywood is used as base for mounting the popular linoleum counter surface.

dence everywhere. The drainboard and cabinet tops, which are to be covered with rubber composition, are plywood; the shelves, cabinet backs, and dust boards are plywood; the floor, which is ready for linoleum is plywood, as are the walls which have been covered with felt as a base for washable wallpaper.

Clothes Chutes and Elevator Shafts

Step-saving conveniences of sundry nature, including clothes chutes, dumb-waiters, and butler's service-passes are made of plywood because the material has many natural advantages for such uses.

Air Ducts

The increasing demand for air-conditioning equipment has developed a new market for fir plywood. Cold



THIS fir plywood dressing table is the pride and joy of its Atlanta, Ga., owner. Notice also attractive moulds covering plywood joints.

air ducts for furnaces and air-changing equipment are now constructed quickly and economically by carpenter labor. Exhaust fan equipment in attics is housed in plywood cabinets and connected to the rooms to be ventilated. Gravity systems may be simply constructed by ingenious craftsmen by utilizing spaces between studs and joists. In any type of system the smooth surface of plywood contributes to the uninterrupted, frictionless flow of air.



FINISHED kitchen completely paneled and cabineted with the ever popular Douglas fir plywood. This one is located in Burlingame, Calif.

"I Like Plywood"

Declares Joseph Weston, Architect

IN A heavy conference not long ago in which the owners of a large property and their financial agents were assembled in solemn conclave, the question was asked, "Why do you use plywood?" Everyone stopped talking to await the answer and I did the best I could on short notice, "Because it is clean, dry, easy to apply, it will take any finish, and is strong—and we live in an earthquake country."

The story however goes much deeper, and my liking for the material is built on several basic foundations which include architectural education, the history of architecture, the economic practice of an architect desirous of working in the low cost field, modern materials and their "integration" into a plan which expresses the living demands of this age, and finally the actual construction of the building.

It appears to me that the source of the term "architect," that is "Master-builder," (look in Webster's if you don't believe it) is sometimes forgotten in thinking of the duties and responsibilities of the architect. Also, to make the situation more difficult the architect is expected to know not only heat, light, and sanitation, but construction in brick, concrete, steel, synthetics and wood. A little design is thrown in too, of course. Quite several mouthfuls to "master."

Well, anyway, in 1932, I decided to concentrate on wood, and have been having a "high" time ever since. I wish architectural schools would have every architectural student determine upon the basic material which appeals to him most, and then carry his design and engineering along with that material in mind.

After the determination upon wood, I went back to my history and found, among other things, that laminated wood, plywood, is an Egyptian art and that examples in perfect repair 3,500 years old exist in the Cairo and other Museums today. I don't know whether to laugh or get sore when some mortgage expert suggests that perhaps I'd better go slowly until plywood has proven itself. "Heavens alive!"—what proof is needed, his chair, his desk, his own front door, I'll wager are of glued up veneers.

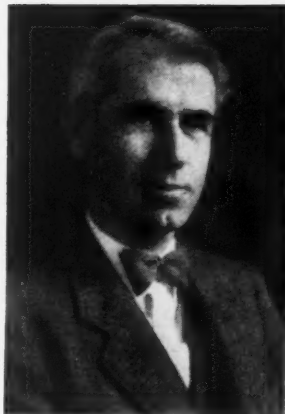
Many architects are anxious to enter the low cost field, but their net profit being unforgivably slim as it is, they try to do what they can in this direction as a side line. This won't work, and the much tried stock plan has not produced satisfactory results.

The architect who wishes to do low cost houses, and at a profit, will have to commit his mind to the problem as a major endeavor. Then he will have to work on a segregated contract basis, with a selected group of sub-contractors with whom he can operate in closest cooperation; or better, he may design and build himself, retaining his professional status by using the fixed fee basis.

Our office has turned to the latter way of handling our affairs. The focusing on one material, in one field, with complete control of all phases of designing and building has been a gratifying experience.

The next step was the adaptation of materials to a planning system which would permit repetition of parts without losing variety of plan.

We are all acquainted with modules, and with the "integrated" house, a modular system which has been ably presented. The question is, what unit of measurement is most practicable to adopt? After much discussion



JOSEPH WESTON, long prominent in Southern California architectural circles, was a student at the University of Pennsylvania School of Architecture, Bellevue School of Art, Paris, and is a veteran of the A.E.F. He has specialized of late years in the smaller type of residences and Group Housing and established an enviable reputation as architect on two highly successful Subsistence Homestead projects.

and trials of from one inch to sixteen feet, we took four feet as our standard.

Being partial to wood it was natural that the four foot sheet of Douglas fir plywood should fall into our scheme of things, and I can add that every expectation has been met.

Our plans are now all laid out on a four foot grid and we use plywood on all interior walls and ceilings.

The problem of the low cost house (1,800 to 2,500 dollars) is a tough one for the government to crack, and just that much harder for the private organization working without subsidy. It can be done, however, and I'm willing to prophesy that it will come about through the coordination of shop and field methods by more careful planning, which, with full knowledge of all operations, utilizes every experience and places in the most economical division, the work of prefabrication and assembly.

The future will bring completed elements of truckable size for one day assemble at the site. We have done two homes in this manner in which finished room units, twelve feet in width were ready for occupancy four hours after delivery. Any width over eight feet, however, becomes a house-moving job, and transportation costs, special fees, and a twenty dollar compensation insurance rate defeat the purpose of low cost. However, rural areas in states or on roads not controlled by rigid load width limits, could well be served today by such a method, and plywood with its great lateral strength makes an ideal material for such usage.

In the allocation of operations to shop and field, we find that shop nailing of plywood is much faster than where done outside. We therefore not only build our casework, frames, and trim inside, but build the walls and ceilings in four foot sections on the bench, and have just completed twenty-two houses in Atlantic Village, Long Beach, Cal., in this manner.

There is, of course, no middle line of taste, but this does not limit our use of plywood. On the walls we omit battens, not marking the panel divisions, and giving unbroken surfaces against which to place furniture. This permits, also, the choice of stain, flat paint, enamel or wall paper.

One happy combination of materials and finishes has been a natural plywood ceiling with redwood mouldings, warm white walls and solid color linoleum floor.

As to the use of plywood exposed on the exterior, we have only three buildings by which to judge, and so far these have perfect batting averages. It is our opinion that water does not present a problem, where the plywood is properly manufactured. We are curious, however, as to the action of dry heat and the actinic rays of the sun.

It goes without saying that we use plywood for an unlimited number of purposes other than wall and ceiling surfaces. Furring, case work, splines, doors, sheathing, and forms, are a partial list.

Need I say more as to why I like plywood—and use it?

Douglas Fir Plywood in a 1937 Residence

By LEA, PEARSON & RICHARDS, Architects

PLYWOOD paneling, combined with careful detailing and workmanship, was used in a large eleven-room house recently completed in one of our residential suburbs. All of the rooms, excepting only the furnace room and a den were finished in Douglas fir plywood.

We used a Wallboard grade of plywood $\frac{1}{4}$ " thick, with standard stud spacing of 16 inches. This produced a very satisfactory, rigid and smooth base for the finishes used.

The section in lower right hand corner of the accompanying detail shows method employed in fastening the plywood panels. The result was a perfectly tight butted joint. This joint when set, was covered with a paste filler and sanded, and the process repeated to make a smooth,

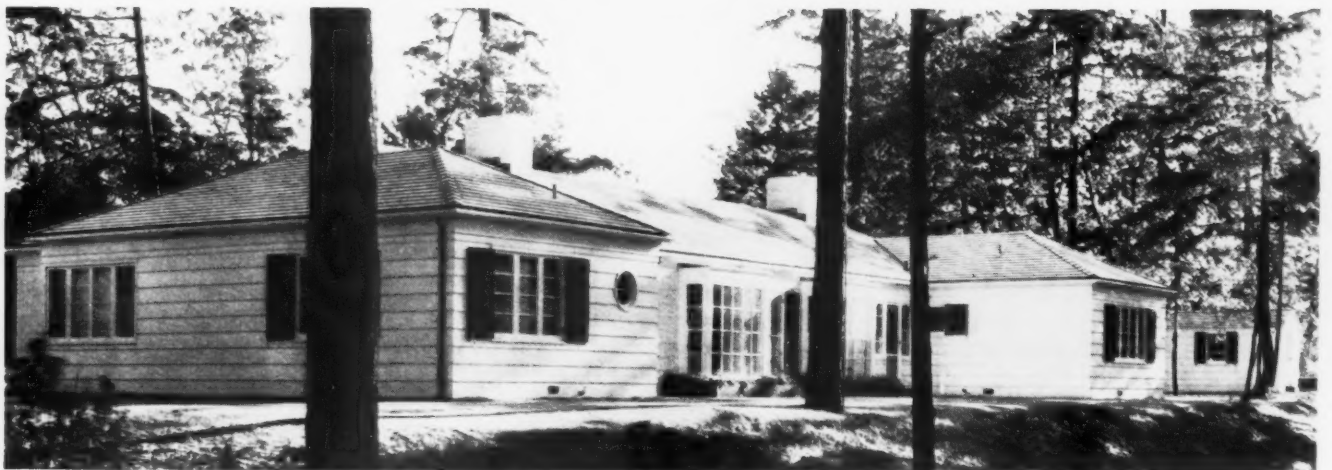
unbroken surface. This same filling was used on any blemishes appearing on the plywood from handling. There were also some small nail holes to be filled, as the plywood had to be held in place until the glue had set. In all cases, before the filler was applied, the plywood was treated generously with "Rezite" to seal the wood.

The photo on this page shows an end of the living-room with plywood paneling. Architectural details of this and of joints appear in the drawing.

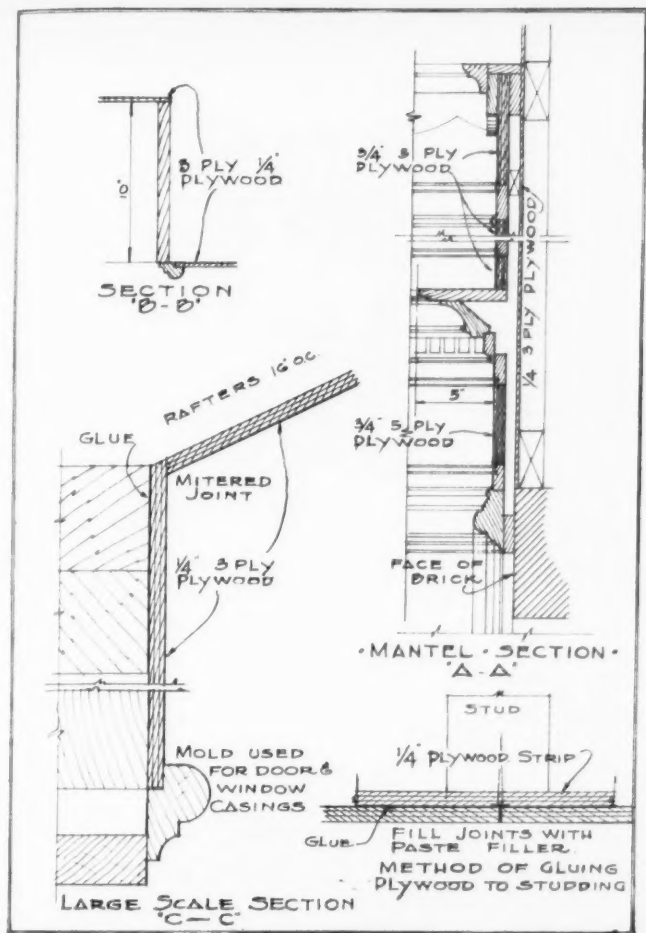
Section "A-A" shows the use of $\frac{3}{4}$ " plywood for heavier paneling around the fireplace. In this construction we used stiles and rails on these panels to allow for a bead moulding, which, at the time we did not believe could be accomplished in the plywood alone. We have



THIS lovely fireplace paneling, wall coverings and ceilings is of Douglas fir plywood. Details are shown on the opposite page.



DOUGLAS fir plywood was used extensively in this spacious woodland home designed by Lea, Pearson & Richards, architects.



DETAILS of wall finish in the beautiful library designed by Lea, Pearson & Richards, architects, as illustrated on page opposite.

found since that this could have been put in with a square router and the edges sanded to round the head into the desired effect.

Section "B-B" shows the type of casing used in all the rooms for window and door trim and for cased openings as well as the bookcases.

In section "C-C" we have shown the mitering of the ceiling plywood to the wall plywood. This miter cut was done on the job without the use of power saw, yet the joint is as clean as if the material were actually bent to conform to the contour of the studding.

The painted finish had for the final coat, a brush-stippled semi-gloss or eggshell finish which produced a fine texture to the surface, and an appearance with which we all were pleased.

The workability of the panels and the finish obtained on this job have convinced us of Douglas fir plywood's adaptability as an interior finishing material.

Douglas Fir Plywood in Doors

The Douglas fir door industry is one of the largest consumers of the highest grades of Douglas fir plywood.

Plywood door panels have replaced the old solid, raised panels so completely that today raised panel doors represent only a small percentage of the output. Some appreciation of the popularity of this type of door can be gained by considering that about fifty million square feet of Douglas fir plywood are used in doors every year.

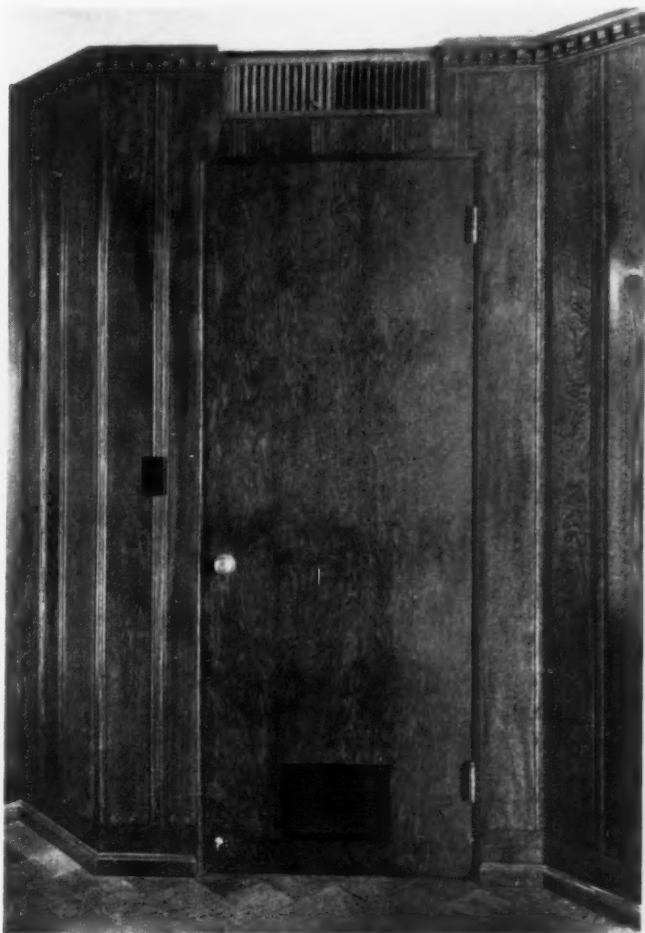
The growing popularity of the slab, or flush, door which harmonizes so nicely with the modern trend in

PHILIPPINE mahogany veneer over Douglas fir core makes this beautiful door used in a Miami, Fla. residence, and furnished by a Fort Lauderdale dealer.



interiors is increasing the demand for the door industry of Douglas fir plywood. Slab doors require high grade faces the full size of the door and for this purpose plywood is ideal. Many of these doors are built with hollow cores to lessen their weight; the plywood faces, acting as a stressed covering, combine with this type of core to produce a strong and lightweight door.

The demand for flush doors in modern kitchen cupboards has been met by the use of 3/4-inch, 5-ply Douglas fir plywood and to some extent lately by a hollow core door similar in design to the large slab doors but with thin plywood faces. In the meantime, panel doors for cupboards are still very popular and for these Douglas fir plywood is used for the panels.



DOUGLAS fir streamliner door in a Miami Beach, Fla., office building. Adjacent Douglas fir paneling matches for grain and coloring.

New Prefabricated Plywood House at Forest Products Laboratory

By R. F. LUXFORD*

EARLY in 1935 the Forest Products Laboratory built its first prefabricated plywood house. Another one-story prefabricated plywood house consisting of a living room, kitchen, two bedrooms, bathroom, and utility room has just been erected on the grounds of the Forest Products Laboratory at Madison, Wisconsin. This new house incorporates the latest findings in housing research. These findings include among other things the use of plywood made up with synthetic-resin adhesive, and provision of moisture barriers within wall, floor, and roof panels. Other interesting features of the new construction are the use of mineral insulation material to increase fire resistance in addition to giving necessary heat and sound insulation, and provision of plywood floors with $\frac{1}{8}$ -inch hardwood veneer as wearing surface.

This house will serve both as an example of the prefabricated method of all-wood construction and as a test of its permanency under actual weather conditions. The house may also serve for the purpose of obtaining additional research information such as the efficiency of the moisture barriers and thermal insulation used.

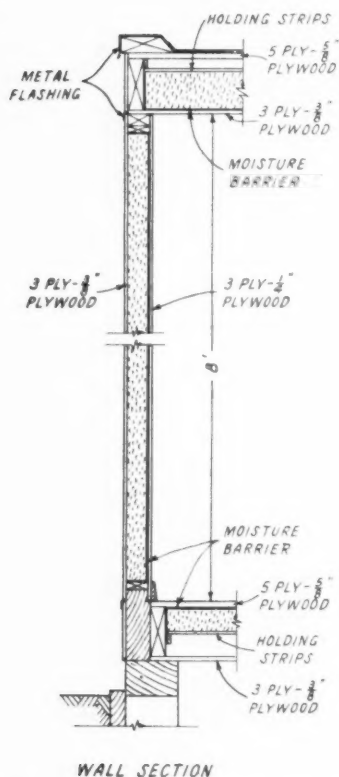
The new house is a basic example of a system of prefabricated all-wood construction developed in line with modern structural research and modern wood fabri-

cation. The system is based on the use of standard units, sections, or panels to be made in large quantities by factory methods, and then assembled quickly and without waste on the site. Its ultimate success will depend on good workmanship and technique in the construction of the plywood and house units, accurate dimensions of units, and efficient painting practice.

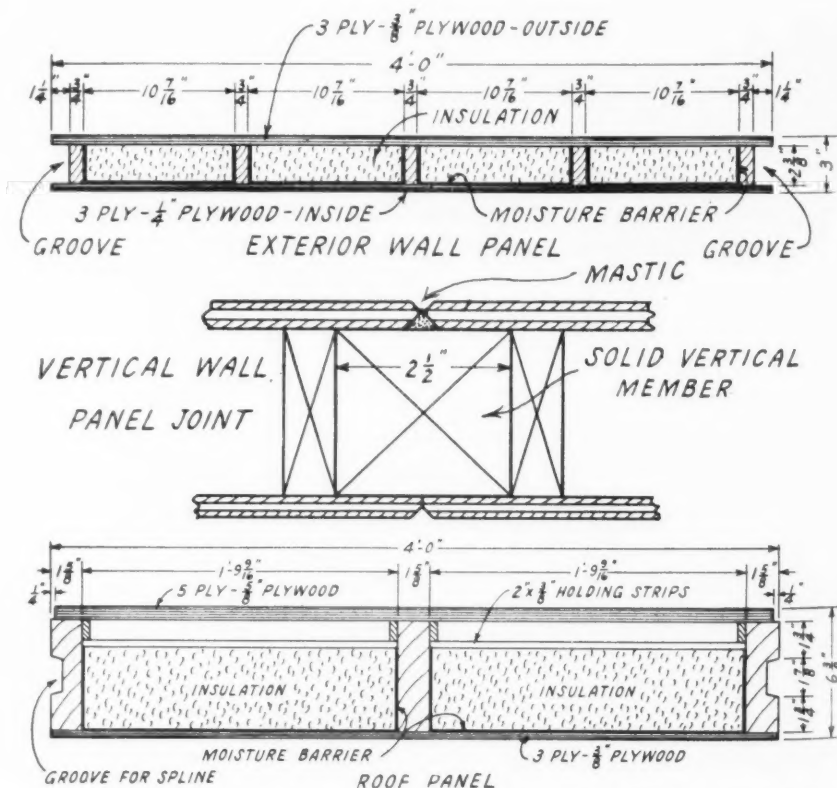
Each panel in the Forest Products Laboratory system of prefabricated construction consists of two plywood faces glued to either side of an inner structural framework to form what is virtually a box girder. While the use of plywood is much in evidence in this new house it is interesting to note that the number of board feet of lumber approximates the number of square feet of plywood.

The differences between the Laboratory's panel system and the conventional type of construction are marked. To choose an example at random, in the conventional type of floor construction the subfloor and finish floor are nailed to relatively deep joists. The subfloor is nailed diagonally in order to stiffen the building, but it is of little benefit to the strength of the floor framework. In contrast to the foregoing, each panel in the Laboratory's system has a complete and continuous rigid joint between the plywood and the framework formed by the glue between the plywood and joists. This causes the entire panel to act as a unit like a box girder and as a result the floor panels will deflect only about one-quarter as much under a given load as the joists acting alone.

*Senior Engineer, Forest Products Laboratory, Forest Service, U. S. Department of Agriculture, maintained at Madison, Wis., in cooperation with the University of Wisconsin.



WALL SECTION



DETAILS of construction of new prefabricated plywood house developed at the Forest Products Laboratory, Madison, Wis., and illustrated on the three following pages.



Wall Panels

A typical wall section, 4 by 8 feet in area, is shown in details opposite. The exterior panels are 3 inches in thickness and consist of $\frac{3}{8}$ -inch three-ply plywood on the outside, and $\frac{1}{4}$ -inch three-ply plywood on the inside. The framework consists of vertical members made of 1-inch material $2\frac{3}{8}$ inches wide, spaced approximately 12 inches apart with two end headers to which the plywood faces are glued. The partition panels are also 4 by 8 feet. Both faces of the partition panels are, however, of $\frac{1}{4}$ -inch plywood, and the vertical members are $2\frac{1}{2}$ inches wide, the overall thickness being 3 inches.

Experiments indicate that these panels when tested as a beam require a load of more than 200 pounds per square foot to cause failure. A 60-mile wind has a pressure of about 12 pounds per square foot, which is approximately one-seventeenth the load required to break the panel.

The plywood projects beyond the framework of the panel forming a continuous right-angle groove $2\frac{3}{8}$ inches wide and $1\frac{1}{4}$ inches deep entirely around the panel. A portion of the sill fits up into this groove. A $2\frac{1}{2}$ by $2\frac{3}{8}$ -inch solid vertical member is fitted into the grooves on the sides of adjacent wall panels. This vertical member serves as a connecting piece between panels, and also carries a part of the roof and floor loads. At the roof a strip glued to the roof panel fits down into the groove at the top of the panel as shown in the details. After assembly the wall, floor, and roof panels are securely fastened by screws or nails to those parts which fit into the groove, tying wall, foundation, and roof together.

The edges of the face of the panel forming the interior house wall are beveled to form a V-joint when the panels are assembled. The panels forming the exterior surface are beveled on the outside and inside edges, the outside bevel to form a V-joint similar to that for the interior wall surfaces, but slightly opened and the inside bevel to form a pocket for mastic which is placed between the panels directly after erection. This pocket permits a sufficient amount of mastic to be placed between the panels so that it will remain plastic indefinitely, and thereby make a tight and permanent seal against the entrance of moisture and infiltration of air at the exterior panel joints.

Floor Panels

The floor panels are 4 feet wide and 12 feet long. The upper face is $\frac{5}{8}$ -inch plywood of five plies, and the lower face is $\frac{3}{8}$ -inch plywood of three plies. These faces are glued to a structural framework consisting of three nominal 2 by 6-inch members spaced approximately 24 inches



PHOTO above shows floor panels being assembled on foundation at Forest Products Laboratory Plywood house.



ABOVE: Wall panels and partition panels partially assembled;

BELOW, all exterior wall panels in place and roof panels being assembled.





THE new prefabricated plywood panel house at Madison, Wis., designed and built by the engineers of the Forest Products Laboratory. Photo shows all panels in place and house completed.

apart, with end headers. All parts of the panels act as a unit and therefore the panels can be substituted for the usual 2 by 10-inch joists spaced 16 inches apart as ordinarily used in house construction.

The lateral edges of the floor panels are grooved to permit a spline connection for the distribution of weight to adjacent panels. When panels of this type are tested as a beam over a 13½-foot span, more than 300 pounds per square foot are required to cause failure. Accordingly, the panels far exceed in strength any loads normally put upon them.

With the exception of the kitchen and the utility room, the upper ⅝-inch plywood is faced with birch ⅛-inch thick to form the wearing and finished floor surface. This construction eliminates the necessity of putting a finished floor over a subfloor as in ordinary construction.

Roof Panels

The roof panels are similar to the floor panels in construction. The top plywood covering of the roof panels was cut back ¼ inch to allow a groove between the panels, and this groove was filled with a caulking compound. With this size of groove it is believed that the caulking compound in the joint would remain plastic for a long time and, therefore, form a better and more permanent seal. After the joints were filled, the entire roof was covered with a material similar to a thin caulking compound.

Kind of Plywood

All exterior surfaces of the house described here are of hot-pressed resin-bonded plywood. The use of plywood in the past for outside permanent construction has not always proved satisfactory because the glues available were not sufficiently resistant to weathering. With the introduction of the resin type of glues this situation has changed. At present plywood glued with the hot-pressed resin glues is being used more and more for outside use with every indication that it will withstand the weather indefinitely without the plies separating, provided ordinary care such as painting the edges and surfaces is used. Resin-bonded plywood has also been used for interior surfaces because of its somewhat greater fire resistance which will be mentioned more in detail later.

Moisture Barriers

Coincident with the introduction during recent years of more moisture into homes by means of humidifying apparatus, houses are also being made tighter by the use of storm windows, weather strips, and the more general

use of insulation within the walls and roofs. In houses loosely constructed, the moisture-laden air, which flows from the warm inside toward the outside, is easily carried away; however, in houses with good insulation and tighter construction, either of conventional type or prefabricated, the moisture is not easily carried away, and when it reaches the cooler areas within the wall it condenses. Over extended periods considerable moisture accumulates, the insulation becomes wet, and its efficiency is greatly reduced. Even when warm weather arrives the moisture disappears slowly and makes conditions favorable for rust, mold, and decay. Many paint problems, such as the peeling of outside paint, also arise from the accumulation of moisture within the walls. Obviously it is very important to prevent such conditions, and, therefore, moisture barriers have been used in the outside walls of this house.

The moisture barriers used consist of asphalt-impregnated and coated paper weighing 50 pounds per 500 square feet. The barriers are placed within the panel and against the back face of the inner walls, against the back of the upper face of the floor panels, and against the back of the lower face of the roof panels; that is, in all cases the moisture barriers are placed within the panels and against the back of the face nearest the inside of the room.

A moisture barrier is placed in each space between framing members, and consists of a single piece of paper so folded as to fit snugly against the plywood face and along the sides of the framing members. Those parts of the sides of framing members that are in contact with the moisture barriers were given a brush coating of asphalt paint just before the barrier was placed, after which the barriers were held to the framing members with wire staples at intervals of not more than 6 inches to keep the paper tightly against the framing members and in contact with the fresh asphalt paint.

Insulation

The walls of the house are 3 inches overall with a 2½ or 2⅜-inch inside space, depending upon the thickness of the plywood used. This space is entirely filled with a mineral wool insulation giving a coefficient of heat transmission for the wall of approximately 0.13. This is superior to ordinary construction with ½ inch of blanket insulation.

In addition, the use of large plywood sheets in wall panels is very effective in making the structure wind tight. Insulation has also been placed in the partition walls for sound-leaden purposes.

The floor panels are insulated with nominal 2-inch mineral wool bats and the roof panels with 4-inch bats.

Fire Resistance

Fire tests at the Forest Products Laboratory of plywood show that the plies of vegetable-glued plywood separate while burning whereas the plies of resin-bonded plywood do not. Resin-bonded plywood will therefore give somewhat greater resistance to fire than will plywood glued with a vegetable glue. On this account, and also because it offers somewhat greater resistance to the passage of moisture, resin-bonded plywood was selected for the inside walls as well as the outside walls.

To obtain greater fire resistance a mineral wool of high density was selected as an insulating material.

Description of the House

The floor area of the house is 24 by 36 feet. The house includes a 12 by 20 living room, kitchen, two bedrooms, bath, connecting halls, and utility room. In addition there is a coat closet and a linen closet off the main hall, two closets in the larger bedroom, and a wardrobe closet in the smaller bedroom. Placed close to the house there is also a large garage, with a space at one end partitioned off for storage. The garage is connected to the house by a roof made of roof panels.

The living room walls are of birch finished natural, while the ceiling is painted a light color. The floors are of birch-faced plywood, as are all other floors, except the kitchen and utility room, which are of Douglas fir plywood. The walls of the hall are also of birch finished natural. The walls of the other rooms are of Douglas fir painted.

The house is heated with an oil burner. A warm air forced circulation system is used, and the heating ducts are confined mostly to that portion of the hall connecting the various rooms. This portion of the hall has a lowered ceiling to accommodate the ducts.



BEDROOM of prefabricated house with painted Douglas fir plywood walls and ceiling, and plywood floor.

A post and plank foundation of creosoted wood has been used.

John W. Root of Holabird & Root, Chicago, was consulting architect, and the Goodwillie-Green Box Company, Rockford, Illinois, were the contractors.

In prefabricated houses there is a decided tendency toward one-story homes. It is, however, both practical and feasible to erect two-story houses with prefabricated panels as constructed by the Forest Products Laboratory. Plans for such a house have already been prepared. The units for this house are now being built, and the house will be erected on the Laboratory grounds near the one-story house here described.

LIVING room showing birch walls and window trim. Joints of floor, wall and ceiling panels form continuous lines around the room.





Low Cost Plywood House

Dri-Bilt House at Gibsonburg, Ohio, Has Unique Features Shown in Details on the Opposite Page

FLOOR PLAN and construction details, house shown opposite; how plywood is used in standard sizes to effect major economies.

THE Gordon Lumber Co., Oak Harbor, Ohio, in co-operation with contractor-builders, is producing and marketing some interesting low-cost plywood houses in a number of Ohio cities and towns. The houses have specifications that read like a Who's Who of building materials and equipment. They get 80 per cent FHA loans, yet can be offered for as little as \$22.50 a month. The house illustrated above was sold as a "lock-and-key" job for \$3,590.

A number of the houses are basementless. All have special features, and economies made possible by using familiar materials in new ways. The oil-burning, forced circulation, warm air heating plant is placed in a centrally located heater room. The spaces between 2" x 2" sleepers beneath the floor are part of the heating system. They open into a central vent that extends across the entire building and connects with the cold air return of the heating unit.

The outstanding economies are effected, however, by using plywood sheathing, sub-flooring, and inside wall paneling. Plywood sheets are laid horizontally, so that standard or pre-cut lengths can be used throughout. Horizontal edges meet over ribbons dadoed into the studs, so that tight joints are made at edges. Inside walls and ceilings are finished with moulding strips and wood rosettes, so as to produce paneled effects at a fraction of their former cost.

Walls can be finished for paint, paper, or canvas if desired, by using invisible glue joints. A plywood ribbon gusset is dadoed into the studs at points where the sheets will meet. The ribbon is coated with glue and plywood wallboard panels are set in place, then bonded before being securely fastened with finish nails. Glue oozes through and seals the joint between edges of the plywood sheets. The surplus is removed with a hand scraper after the glue has dried thoroughly. In this way a perfectly smooth joint can be made.

Outline Specifications

FOUNDATION: 8" concrete or concrete blocks, 3' below grade on a 16" x 6" concrete footing. Slab of 3" wire mesh reinforced concrete laid over a fill.

WALLS: Wood siding or red cedar shingles on 5/16" 3-ply plywood fir sheathing. Weyerhaeuser Guide-Line framing. Inside walls, 3-ply Westboard panels, wallboard grade, finished with DeVoe & Reynolds velour flat.

INSULATION: Rock wool in ceiling.

ROOF: J-M asbestos shingles, copper flashing.

FLOORS: Tempered hardboard, oak, fir, or yellow pine on 5/8" Westboard, sheathing grade, on 2" x 2" treated wood sleepers.

TRIM: Westboard trim, rosettes, half- and quarter-rosettes, and mouldings.

MILLWORK: Curtis kitchen cabinets.

WINDOWS: Curtis Silentite, with Mitertite trim.

WALL FINISH: J-M asbestos flexboard wainscoting in kitchen and bath.

EXTERIOR PAINT: DeVoe & Reynolds two-coat system.

HEATING: Duo-therm oil burner, forced circulation, or Bryant gas heater.

PLUMBING: Standard Sanitary enamel ware and fixtures.

Plywood Interiors Used in New Stran- Steel Panel Homes

THE new type of prefabricated home recently introduced as the "Stran-Steel Composite Panel" home by the Stran-Steel Division of the Great Lakes Steel Corporation, Detroit, utilizes panels made in the lumber yard with plywood on the inside attached to wood studs and rigid insulation board on the outside. Doors and windows are likewise fitted into these panels at the lumber yard.

The panels are delivered to the contractor at the site of the home where they are locked into Stran-Steel channel and stud framing. Wood, brick or shingles may be used for the siding and any type of roofing material. Battens of wood cover the joining of the plywood inside walls which are finished with paint. The ceiling insulation board is cut to resemble tile. The house can be erected in a week.

An important feature of the house is the "skyscraper" construction with Stran-Steel framing throughout. The patented nailing groove of Stran-Steel framing permits nailing of wood or other collateral material direct to the steel.

The model home constructed, with wood siding and asbestos shingle roofing, can be sold complete, ready for occupancy, for between \$2,500 to \$3,000, depending upon local real estate costs.

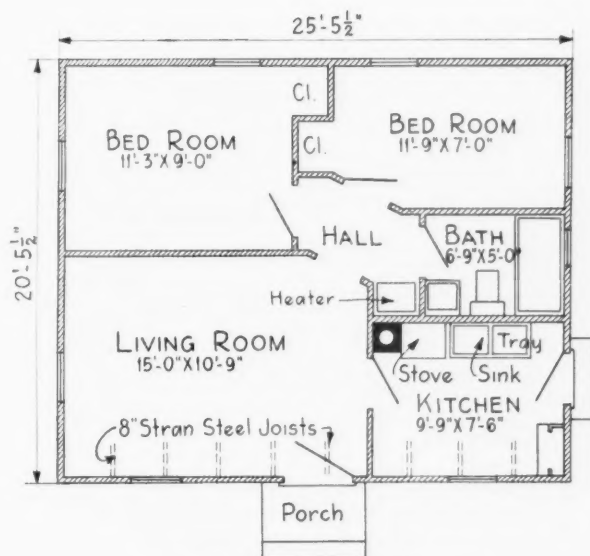
The four rooms of the model house are living room, kitchen and two bedrooms, each of the two latter with a clothes closet and doored-cupboard. The kitchen has an enameled sink and tray for laundry, and cooking is done by electricity, gas or oil. Circulating heat from an oil burner, housed in a hallway niche, provides warmth at a low cost. The bathroom has modern regulation equipment.

This approach to the low-cost home brings the cost well within the pocketbook of the average wage earner. It will permit prefabricating practically on the ground; the paneling will be done by local lumber dealers and the erection by local contractors. These homes will not be built by Stran-Steel. This system is especially adaptable to large projects where benefits of mass production will mean substantial savings.

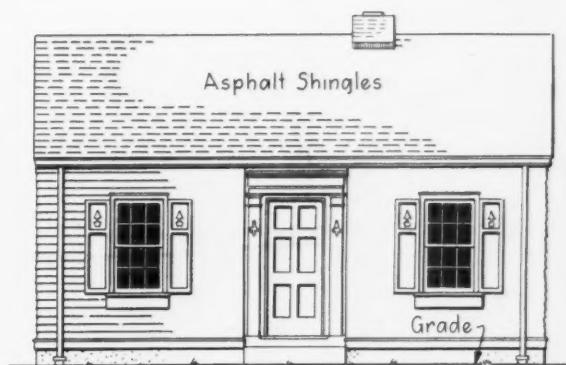
LEFT, TOP TO BOTTOM: The first Composite Panel home designed by the Great Lakes Steel Corporation as it appears erected in Ecorse, Michigan; 54 hours is the time required for assembling the super-structure of this size house. Close-up shows a window panel as it comes from the lumber dealer and is set in place after the foundation, sills, joists and sub-floor are ready. Windows, doors and regulation Composite Paneling are locked together by the Stran-Steel studs and horizontal members. The section of living room in first Stran-Steel Composite Panel home shows batten-covered plywood wall finish.

OPPOSITE PAGE: Floor plan, elevations and construction details of Stran-Steel Composite Panel home.

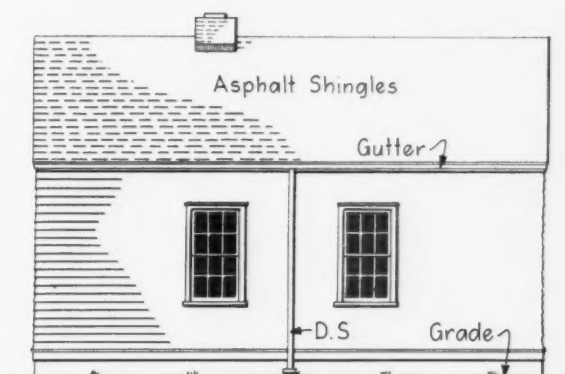




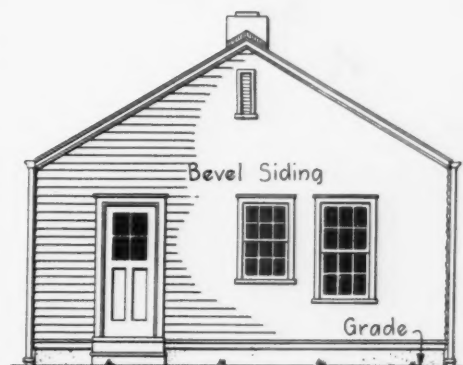
FIRST FLOOR PLAN



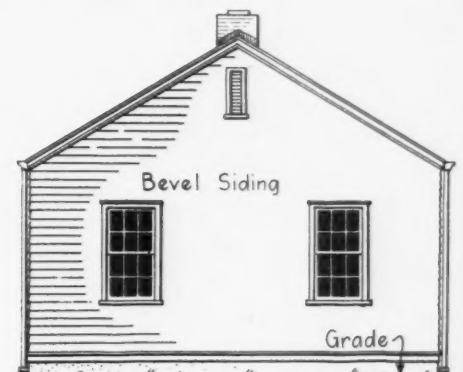
FRONT ELEVATION



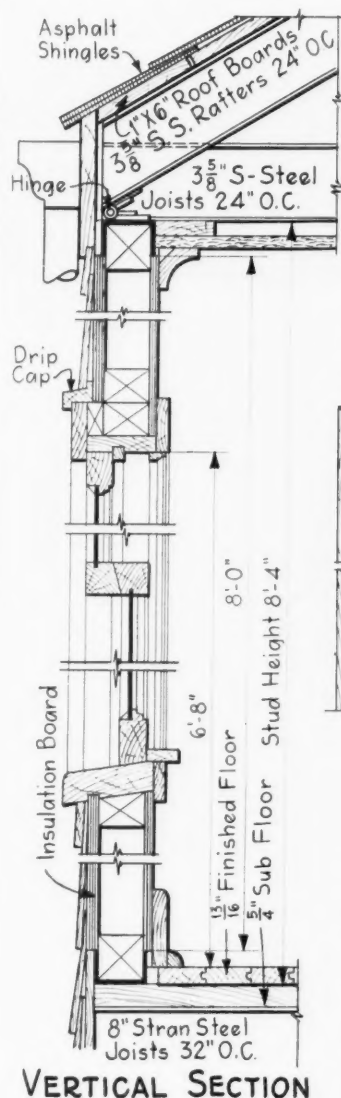
REAR ELEVATION



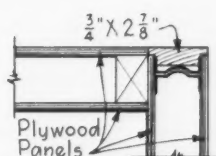
RIGHT SIDE ELEVATION



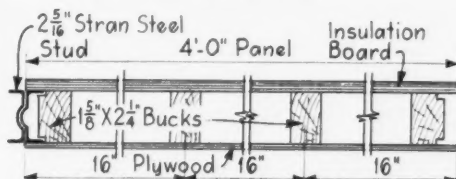
LEFT SIDE ELEVATION



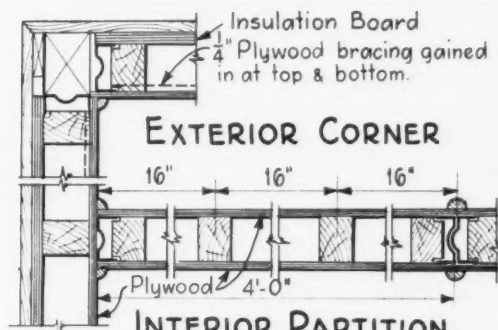
VERTICAL SECTION



INTERIOR CORNER

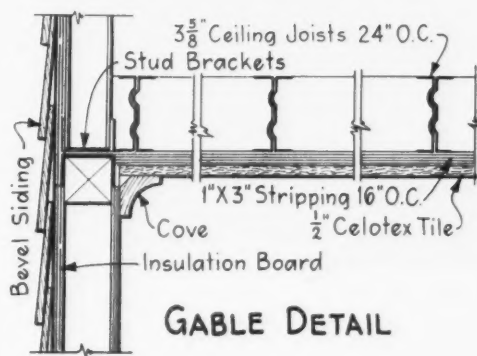


TYPICAL EXTERIOR WALL PANEL



EXTERIOR CORNER

INTERIOR PARTITION



GABLE DETAIL

Stores and Shops Go Modern

NO division of tradesmen is more keenly aware of the influence of store decoration than those catering to women. Women, it is said, are more sensitive to beauty and respond accordingly to a greater degree than men. That is why the exclusive caterers, particularly in fashion goods, exert unusual effort to provide comfort, convenience, eye appeal, and that intangible quality known as "glamour" to their shops and salons. To a degree all trade reacts similarly. Little wonder, then, that successful and alert merchandisers are continually modernizing their stores. The old sales adage, that "goods well displayed are half sold," is as sound today as when it was coined generations ago.

Douglas fir plywood, because of its diverse qualities, is playing an increasingly important part in providing the "correct atmosphere" for goods and making it easy for a shopper to say "yes."

People regard the friendly warmth of feeling and the substantial appearance of walls and fixtures of wood, which have been designed with an eye to beauty as well as utility, as the key to the personality of the store. "Initial impressions—in store operation, as in other things—are important, and it is good business to recognize their value," is the conclusion reached by the committee of the United States Department of Commerce, who recently completed a study of Store Modernization Needs.

Today's decoration trend is definitely to the modern "streamline" effects with emphasis on horizontal lines. The effect of clean lines, unimpaired by profuse decoration with a rational flow of the surfaces into functional

features, is the mark of the modern decorator. How the giant panels of fir plywood fit into such a theme of decoration is attested in the accompanying pictures. A harsh note is felt in the old type store which is completely out of tune with the times, and which exemplifies the need of things made with plywood. The same store-room can be keyed up to the modern tempo. The cases, display table, fitting booths, and partitions all should be made of fir plywood.

The modern effect is being successfully achieved by the correct utilization of plywood's inherent characteristics.



PLYWOOD as a background for beauty in hats—in high, wide and "what have you?" styles.



THE artistry of the decorator and the skill of the craftsman fashion fir plywood into walls of simplicity and distinction.

Display tables are of 1 3/16", 7-ply, Good 2 Sides grade. Rounded corners on showcases are accomplished with 3/16" Good 1 Side while the rounded corners of partitions are done with 1/4" Wallboard grade.

Illustrated is another store brought up to current standards with Douglas fir plywood. Here the material is in evidence everywhere. The concealment of panel joints graphically demonstrates plywood's response to the craftsman's skill. The grilles over the doors are jig-sawed from plywood and painted. Paint decoration is semi-gloss. Metal mouldings, balustrades, and cashier's grille offer contrasts and further indicate a tasteful use of materials.

Douglas fir plywood finds its uses for constructing false ceilings, covering pillars, air and light ducts, and a host of special features. Counter and cut-out displays are made of it because of its strength, smoothness, and workability.

Window backings of fir plywood have long been popular with construction and designing people. The large lightweight panels may be handled easily if the window back is of the removable type. This type is currently popular in many sections of the country for the reason that decorations may be applied in the window-dresser's studio and after completion, brought to the window for exchange with those panels which have served their period of display.

Office and Store Partitions

One of the first uses to which Douglas fir plywood was put was in the construction of panel partitions. The suitability of the product for this purpose is still unsurpassed. Today, partitions of permanent and standardized removable units, utilizing the primary characteristics of the giant plywood panels are used in offices, stores, schools, churches, and other places where interior space division is required.

In store equipment, plywood partitions for fitting rooms, private booths, department divisions, stock rooms,

and many other similar places, the large warp-proof, easily decorated, panels are widely used.

The grades and thicknesses selected for such purposes depend, of course, on the ultimate appearance and the service required. The standard Wallboard grade is often used where only one side is to present a decorated surface, but more often both sides are finished, in which event the GOOD 2 SIDES grade is required for stained or natural decoration, and the SOUND 2 SIDES grade if paint is to be used.

Interchangeable standardized units are constructed utilizing plywood panels in conjunction with various types of rabbeted stiles, plates, and trimming units to conceal joints. Flush joints with open or concealed fastenings are also made as are frank V joints alone or with additional routed grooves to suggest narrower vertical paneling.

* * *

From a Satisfied User

Morris, Ill.

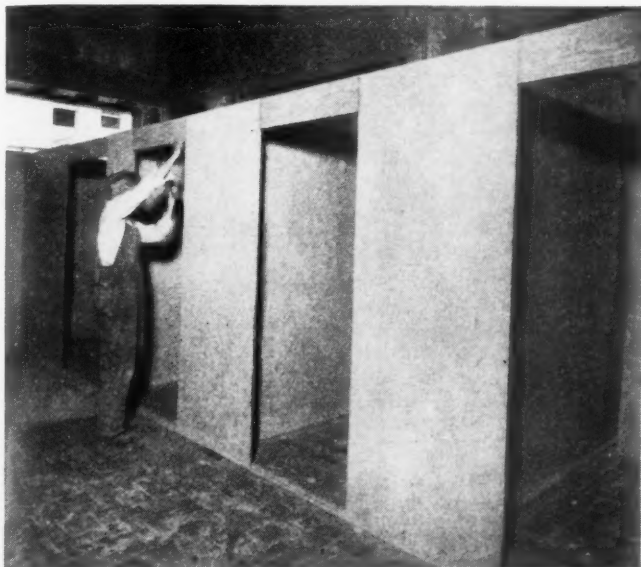
To the Editor:

In the new home I built last season, I used fir plywood, not only in the kitchen and two baths, but in the living room, front hall and dining room, and covered same with carpet. It is working out very nicely.

I. N. R. BEATTY LUMBER CO.

By Henry Newman

FITTING Douglas fir plywood for restaurant booths. These strong, wide sheets make this a popular material for such uses.



PLYWOOD partitions, sturdy and rich, used in this Los Angeles office.

Plywood Forms for Concrete

THE phenomenal increase in the use of Douglas fir plywood for concrete formwork, is attributable, in the final analysis, to one vital factor—*PLYWOOD saves the contractor money.*

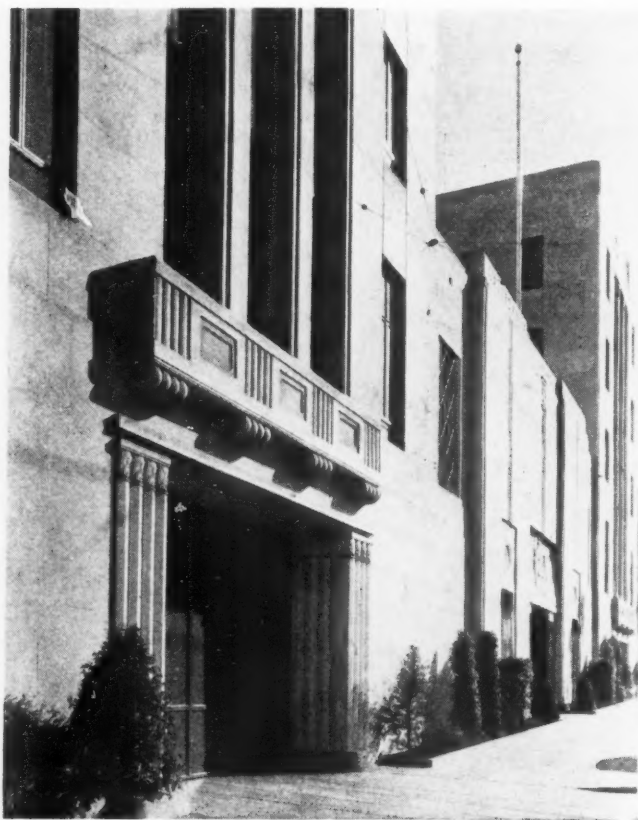
This saving is effected by the inherent characteristics of plywood, and includes reduction both in material costs through repeated uses of the same panels, and in labor costs through ease of handling, workability, large panel sizes, smoothness, minimum of joints and consequently little or no rubbing.

From the massive concrete piers of a monumental bridge to the lowly basement walls of a housing block, fir plywood offers the contractor an efficient, economical medium.

To the architect, seeking new beauties in concrete masonry through an artistic arrangement of ornamentation, backed with smooth, plain surfaces, plywood offers a modern implement.

A special Douglas fir plywood grade, known as "Concrete Form Panels" is made for these ever-growing services. This grade is made with a special glue, exceptionally high in water-resistance, although not to be confused with the synthetic resin hot-pressed glues. Nevertheless, the Concrete Form Panels achieve the purpose intended as evidenced by thousands of jobs all over the country. Fifteen to twenty re-uses are common for these special panels, one of the best known applications being for the concrete roadway of the new San Francisco-Oakland Bay bridge, as well as the viaduct approaches for the Golden Gate bridge.

Repeated re-use brings down the unit cost of forms to



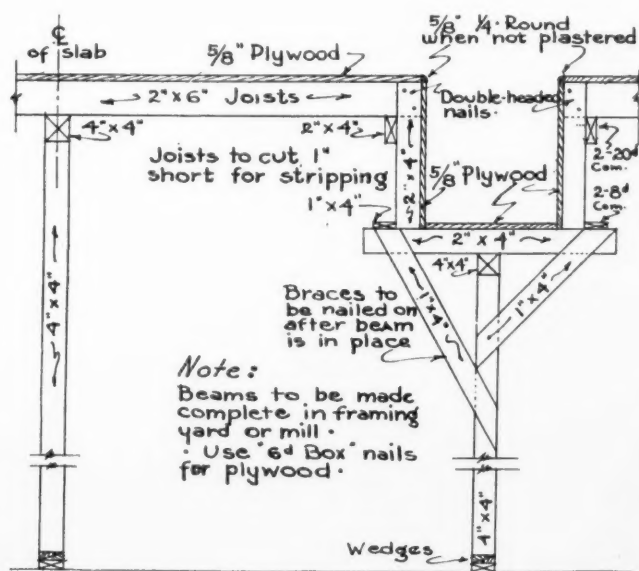
ARCHITECTURAL beauty attributable in part to the use of Douglas fir plywood forms. Photo shows California Fruit Growers Exchange, Los Angeles.

small figures, with indirect savings on material storage, handling, and overhead.

Building contractors in many larger cities, learning of plywood formwork savings, are utilizing the special panels for residential basement walls, moving the panels, nailed to a simple 2x4 frame, from job to job, and thus showing form costs as low as one (1) cent a square foot for material.

As to suitability, the concrete form panels of plywood are satin-smooth, and, by virtue of their large dimensions, produce smooth finished concrete, practically devoid of fins and blemishes. The savings in rubbing and finishing a job formed with fir plywood are estimated by experienced and reliable contractors at from seven to fifteen cents per square foot.

Plywood form panels are available in thicknesses of $\frac{1}{2}$ ", $\frac{9}{16}$ ", $\frac{5}{8}$ ", $\frac{11}{16}$ " and $\frac{3}{4}$ ", to serve as sheathing and lining combined. Largest, and most common of stock panels are 4'x8', probably the most practical size for the majority of concrete jobs.



TYPICAL beam and slab forms of Douglas fir plywood.

Most popular thickness is $\frac{5}{8}$ ", although large volumes of $\frac{9}{16}$ " and $\frac{3}{4}$ " are used.

All of these panels are unusually rigid and strong, free from splitting, buckling and troublesome warps, and as a consequence, the concrete surfaces are straight and true.

Plywood forms may be procured with a mill-priming or oiling, thereby reducing cost of treatment at job. They should be cleaned and oiled again before each re-use.

Carpentry labor is minimized through the time saved in handling plywood. No cleats are necessary to build up wide panels. Nails are driven easily, within $\frac{1}{4}$ or $\frac{3}{8}$ inch of edges without danger of splitting the sheet. In applying form panels to a frame, the nails used should be as small as practicable, i.e. 5d nails for panels up to $\frac{5}{8}$ " thick, and 6d for $\frac{11}{16}$ " and $\frac{3}{4}$ ". Double-headed nails should be used wherever possible to facilitate stripping.

For curved walls, arches and the like, and for jobs not large enough for repeated uses, builders often use $\frac{1}{4}$ " plywood in the wallboard grade, as a lining material. It should be applied with 2d nails on a sheathing either

of $\frac{5}{8}$ " plywood or of solid lumber. This thin plywood will produce the same smoothness in the concrete as do the thicker form panels, but should not be called upon for more than one or two re-uses.

Contractors should distinguish between the grade-marked "Concrete Form Panels" made with special glues and intended for repeated re-use under severe conditions, and stock panels of a Sound 2 Sides grade intended for general interior use.

Some Concrete Form Panels are also edge-coated with special colored sealers to facilitate identification and to give added protection.

* * *

Plywood Basketball Floor Enters Its Third Year

The University of Washington's portable basketball floor of Douglas fir plywood has recently been laid for the third successive season on the Seattle campus. Each panel fitted into its allotted place, accurately and quickly to form a playing surface as smooth and perfect today as it was two years ago.

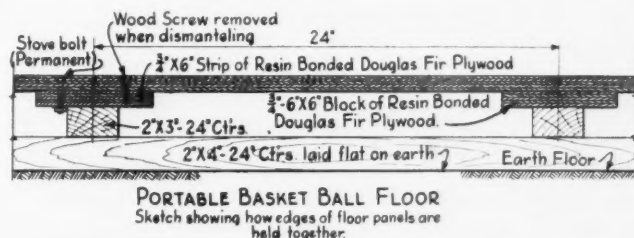
The use of plywood for a great University's basketball floor is due to the initiative and research work of Professor Charles C. May, Superintendent of Buildings. A previous floor, not plywood, had caused continuous maintenance expense and difficulty. The service conditions were rigorous since the basketball court had to lie each season on the earth floor of the athletic pavilion, other times used for track and field work. Near the surface of the earth floor are a number of steam pipes which cause a constant state of dampness under the floor and since the air above is cool, condensation is heavy. This proved the undoing of the original floor and during the basket-

ball season carpenters were kept busy three days a week repairing sections that had buckled from absorbing moisture.

The solution to these problems has been found in the present floor built of 4 x 8 foot resin-bonded Douglas fir plywood panels.

The accompanying sketch shows the details of the floor construction which consists essentially of 2 x 4 stringers placed on the ground, over which go 2 x 3's, on which the resin-bonded panels are placed and screwed down to plywood strips in such a way as to effect a continuous solid panel.

In regard to the playing qualities of the floor, it is the unanimous opinion of the coaches and players that the plywood floor is superior to the old one in every respect. Ralph Bishop, ex-varsity player and Olympic Champion, states, "The portable plywood basketball floor at the University of Washington is the best floor I have ever played on—this includes the best floors in the United States and a few in Europe. A plywood floor gives resilience combined with durability. Also, a plain surface devoid of adjoining cracks gives the players' shoes better traction. These are the essentials of a good basketball floor."



PORTABLE BASKET BALL FLOOR
Sketch showing how edges of floor panels are held together.

DETAIL of construction of removable basketball floor. Note how the joints are reinforced with $\frac{3}{4}$ -inch 6 x 6 inch block of resin-bonded Douglas fir plywood, bolted to one panel and with wood screws into the next. Steam pipes for heating the area are in the ground immediately under this flooring, making a particularly severe condition for decay, warping, etc. Yet this basketball floor has stood up for several seasons.



THE University of Washington basketball floor of Douglas fir plywood laid on the ground in the Campus field house at Seattle, Wash. In spite of this severe service, these panels have been relaid season after season without apparent depreciation.

Plywood for Industrial Buildings, Schools, Etc.

WAREHOUSES, schools, exhibit halls, and recreational buildings are but a few of the structural types in which fir plywood is in demand.

Rigid surface coverings, subflooring, and sheathing are logical uses for plywood in these heavier duty buildings just as in residences. In addition, the ingenuity of the trained architect and the experienced builder often discovers unorthodox functions which plywood can fill with complete satisfaction.

In a large addition to a refrigeration storage plant between Seattle and Tacoma, fir plywood was called upon for several important services. The design involved the use of treated sawdust as insulation in walls and floors. Stock fir plywood sheathing, 5/16-inch thick was used on each surface of the walls and partitions not only as structural sheathing but also as a container for the sawdust. Over the plywood was placed two layers of a vapor-proof paper to exclude moisture from walls and thus prevent condensation. Finally, a surfacing of 1/4-inch resin-bonded fir plywood was installed on the interior walls and ceilings of all the various cold storage rooms, as well as on the exterior. The builder, Steve Gray of Puyallup, Washington, estimated labor savings of 60 per cent through the use of plywood sheathing.

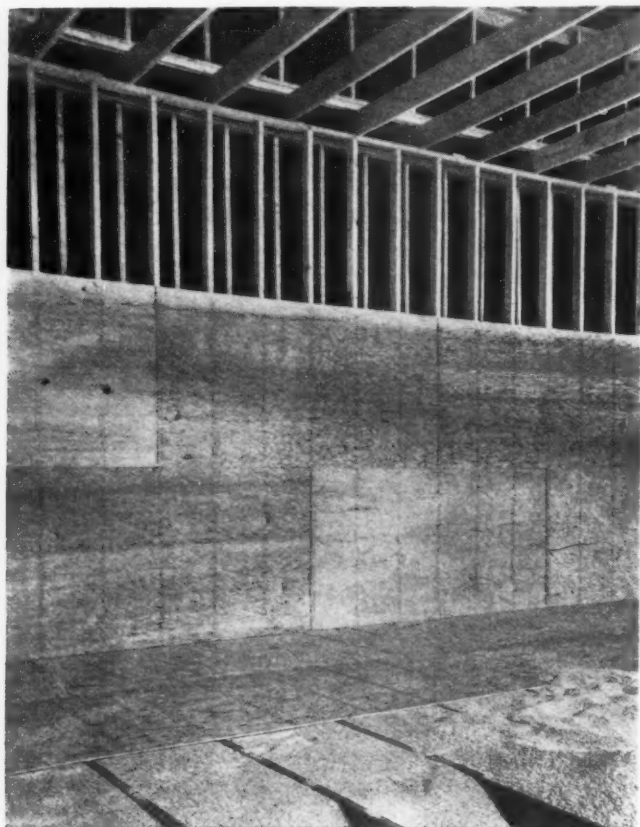
At the Cleveland Exhibition in 1936-37, the great Hall of Progress was built with rigid timber frames, sheathed with stressed coverings of Douglas fir plywood which was designed to carry a large portion of the load. A

nailing schedule carefully worked out by the engineer, C. Merrill Barber, made it possible to utilize 5/8-inch stock panels of fir plywood for such an important structural service, thereby reducing the framing difficulties and costs, and creating an appearance of unusual strength and solidity.

Earthquake hazards in various localities have accentuated the need for designing schools and other public buildings to provide for the horizontal vibrations and stresses due to earth tremors. For such designs fir plywood is a natural, logical material in floors and roofs.

In addition, many localities employ temporary or portable school rooms to provide facilities in new but rapidly expanding residential areas.

Excellent utilization of fir plywood is shown in photographs of a modern double-unit portable school building. For the weather surface, 1/4-inch resin-bonded fir plywood is used, with careful attention to flashing of horizontal panel joints. Noteworthy is the thin 1/4-inch subflooring, also of resin-glued material. The architect selected this to assure permanency against dampness from



PLYWOOD sheathing, sub-flooring and siding combined with lumber framing and treated sawdust insulation to produce efficient refrigerating warehouse in the Pacific Northwest.



PORTABLE bunkhouse developed by the U. S. Forest Service for rangers in the Tieton Mountains. Sections consist of Douglas fir plywood walls, floors and roofs with simple trussed rafter construction. Units are bolted together on the job when these portable bunkhouses are assembled.

below, since no basements are provided, and also as an air-tight and dust-proof membrane.

Even this 1/4-inch fir plywood served as a suitable working platform during construction, although it will be covered with a conventional hardwood strip flooring.

Portable buildings and units are in demand for camps, bunk-houses, and cantonments. The obvious advantages of fir plywood are strength and rigidity, light weight, and large panel sizes.

Portable units being built for the Forest Service are illustrated. Roofs, sidewalls, and floors are sheathed with stock plywood, with a heavy building paper covering the roof. Walls are thoroughly painted, with moulding strips for added joint protection. For permanent construction,



THE Great Hall of Progress at the Great Lakes Exposition in Cleveland, 1936-37, was built with rigid timber frames, sheathed with stress coverings of Douglas fir plywood. C. Merrill Barber, engineer.

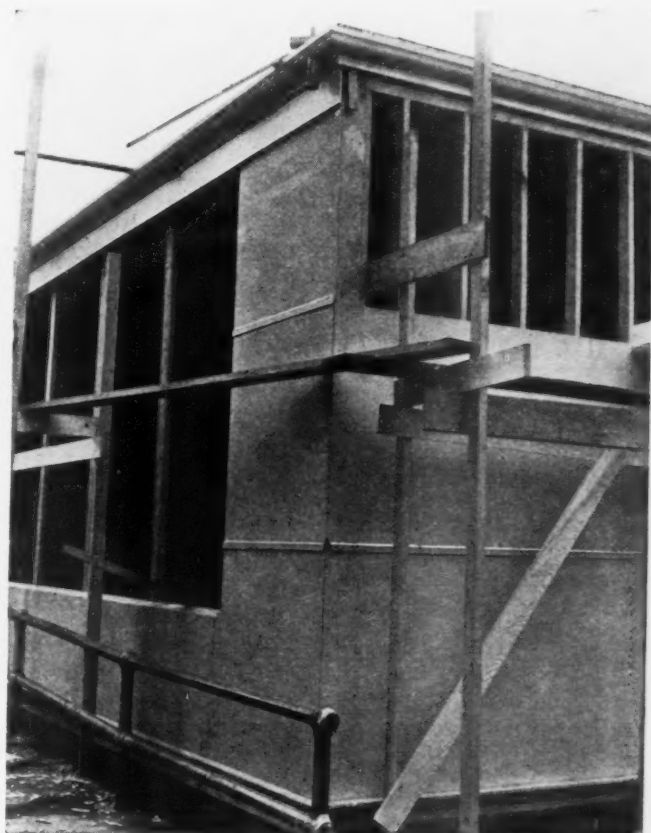
waterproof plywood would be the choice for walls and roof.

Recreational buildings at pleasure resorts such as the world famous Paradise Valley in the shadow of Mount Rainier, offer numerous possibilities for judicious use of fir plywood. Thousands of feet of it have been used by Manager Paul Sceva in making Paradise Inn and other buildings there comfortable and attractive for the visiting thousands. In addition to conventional wall paneling, plywood has been used as a wainscot to protect porous insulating materials; as a temporary ceiling during the zero winters, to isolate the upper portion of the huge lobby; and as a winter dance floor for guests warming up for the next day's skiing. This floor is kept well varnished and waxed and is reported to be in perfect condition as it enters its second season.

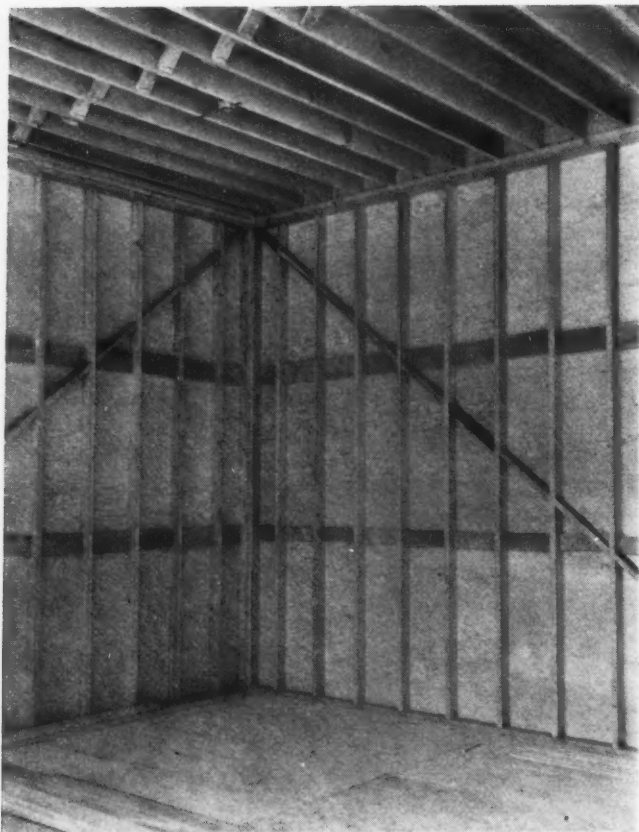
Fir plywood thus offers an opportunity for low-cost dance floor installations in the thousands of roadside inns, food emporiums, and what-nots dotting the highways of America.

Tourist cabins, which in many sections of the country approach home comfort in their appointments, are using fir plywood.

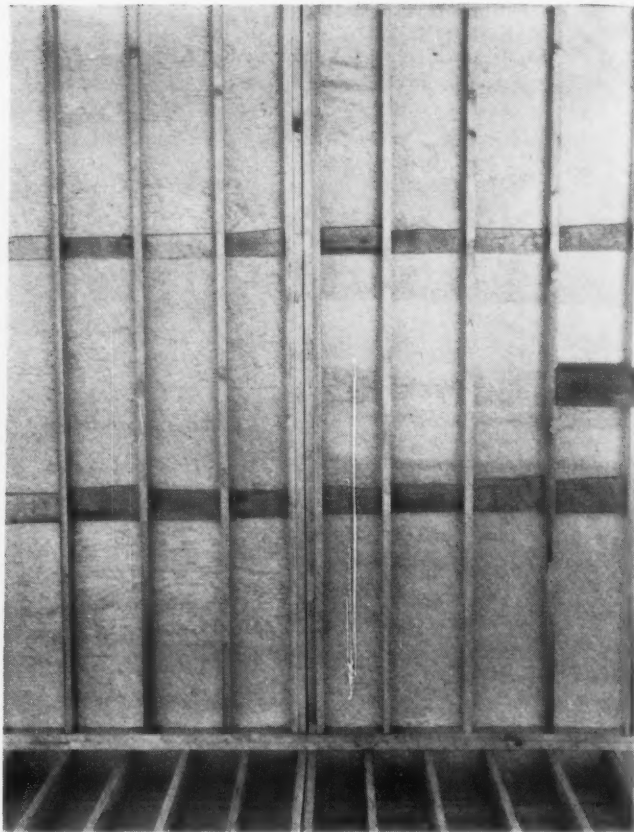
When the Boy Scouts come to town for their annual jamboree, or when a great festival, convention, or fair



A portable school with exterior surface of resin-bonded Douglas fir plywood. Horizontal joints between sheets is combination of wood moulding and sheet metal flashing.



INTERIOR corner showing 1/4-inch resin-bonded plywood on walls and floors. Note one-inch material fitted between studs as backing at horizontal joint lines.



VERTICAL joints between two units permitting either to be moved to new site. Plywood walls and sub-flooring add necessary rigidity for all portable structures.

draws near to tax the facilities of a city, the opportunities appear obvious for an enterprising civic body to meet such emergency peak loads through the speedy erection of plywood cabins, barracks, mess-halls, and auxiliary buildings. Floods and other calamities may create similar housing emergencies.

We venture an editorial augury that in case the pres-

ent international policy of ruthless conquest embroils the U. S. in its wake, the U. S. War Department, always alert to modernization, will produce from its files detailed plans for cantonment buildings in which Douglas fir plywood is the principal covering material.

Ruggedness and wide adaptability fit it for the role of the "multi-purpose material."

Farm Uses of Plywood

By HENRY GIESE

Professor of Agricultural Engineering, Iowa State College

THE great need at the present time in farm construction is a better conception of the use requirements or functions of the buildings and a more scientific use of materials in accomplishing the desired results.

A survey of existing farm buildings shows a number of weaknesses in the basic construction. A few of these are:

Bracing. Many buildings are short-lived and expensive on an annual cost basis because of failure to provide diagonal braces. The conventional construction using vertical and horizontal members only, easily settles out of shape when subjected to wind loads or to pressures exerted by stored farm crops.

Anchoring. Insecure anchoring to the foundation permits overturning or sliding off the foundation in wind-storms.

Splitting. Ends of sheathing boards spliced over studs,

joists or rafters are frequently split by the nails.

Air infiltration. Much is now being said of ventilating and insulating animal shelters. Neither can be controlled if walls and ceilings are full of cracks permitting almost unlimited air infiltration during high winds.

Weight. The increase in the use of movable structures makes excessive weight and clumsiness in handling a problem.

Because of its inherent strength properties, its availability in large sheets, its relative freedom from splitting, and its ability to overcome the difficulties mentioned above, plywood may find successful application in all of the buildings commonly found on the farm and including houses, barns, cribs, grain bins, hog houses, poultry houses, brooder houses, cattle and sheep sheds, fruit and vegetable storages, farm shops, garages, machinery sheds, self feeders, etc.

A few of the specific uses are roof and side-wall sheath-

BOTH interior and exterior of this large poultry house are covered with Douglas fir plywood panels which speed construction and provide a weather-tight structure.



ing, flooring, doors, walls, ceiling, bin lining, feed boxes, ventilating flues and many others.

Its greatest contribution will doubtless be where the service rendered gives promise of offering material improvement in performance over present construction methods. The poultry brooder house and the individual hog house are good examples.

A brooder house, almost a farm necessity, should be comfortable, economical, and convenient. To be comfortable, it should be warm and dry, properly lighted and ventilated, and of adequate size; one that can be successfully heated with one brooder stove and yet give the chicks sufficient room. To be economical, it should be relatively low in first cost and yet be strongly built and durable to give long life free from expensive upkeep. To be convenient a movable brooder house must be capable of being cleaned easily, properly proportioned and readily moved.

First of all a brooder house must be movable. Designed to house chicks on clean ground away from disease, it fails to serve its intended purpose, if for any reason, the farmer does not move it. Most of the brooder houses

now built weigh from 2,000 to 3,000 pounds and are so heavy that they can be moved only with difficulty.

If the heavy, clumsy structure is moved frequently over rough ground, joints are loosened and short productive life results. By using large panels of relatively thin plywood, the weight can be reduced by more than one-half. In addition to using thinner materials, the size of supporting members can also be reduced. Plywood construction reduces the number of cracks and helps to control infiltration. By adapting the plywood to curved roof construction, the necessary head room can be provided for the operator with a material reduction in the exposed area and the space to be heated.

Possible Uses for Plywood

(The summary of a study of Midwest Plans)
Probable Adaptability

Average Building	Adapted		May be Adapted	
	Quantity sq. ft.	% Total bd. ft.	Quantity sq. ft.	% Total bd. ft.
House.....	1,200	11	17,050	45 1/2
Barn.....	850	3 1/2	15,100	60
Cattle and sheep shed.....			3,130	45
Hog house.....			1,700	30
Brooder house.....			1,365	65
Poultry house.....	550	2	3,980	80
Hay shed.....			4,900	53
Grain storage.....	500	4 1/2	2,600	25
Fruit and vegetable storage.....	900	22 1/2	1,460	40
Garage.....	800	36	1,100	50
Machine shed and shops.....	200	4 1/2	3,300	44
Ice house.....	150	3	3,350	84
Milk house.....	160	15	500	50
Creamery.....	500	4	4,525	37 1/2
Concrete stock tank.....	130	65		
Livestock self feeder.....	8	1 1/2	240	50
Poultry self feeder.....			11	58
Septic tank.....	106	37	45	16
Filters and cisterns.....	60	25	34	14
Average.....		11 3/4		42 1/4



POULTRY brooder house using laminated bent rafters and plywood panels weigh less and are stronger than when built of natural lumber.

Tool Cabinet of Plywood

A neat tool cabinet of unusual capacity for its size and of exceptionally rigid construction is presented in the accompanying illustrations.

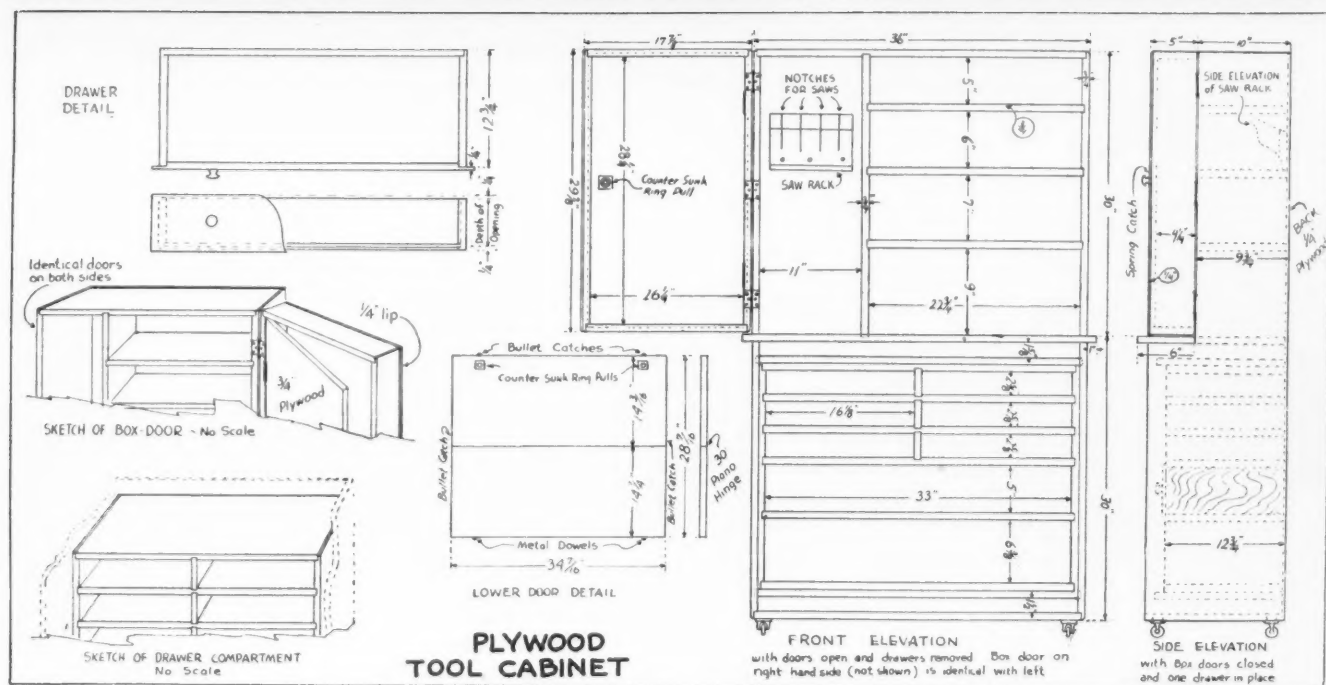
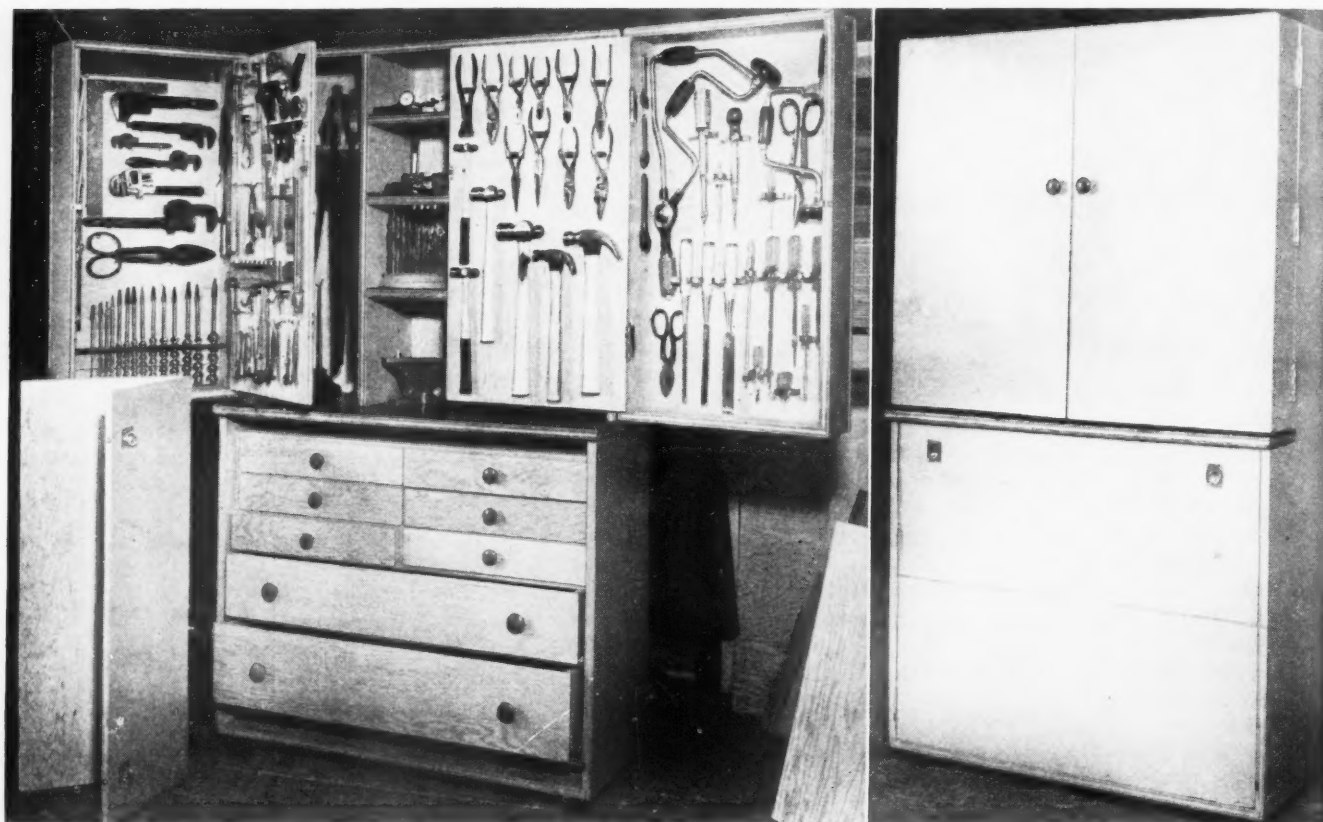
As shown in figure 1 the front panel of each of the two box-door tool compartments is made of $\frac{3}{4}$ -inch plywood, dadoed $\frac{1}{2}$ -inch all around to lap over the sides. Both of these panels should project $\frac{3}{32}$ -inch toward the center of the door. This lip eliminates the gap which would otherwise be present when the doors are closed. Be sure to use $\frac{3}{4}$ -inch plywood rather than $\frac{1}{4}$ -inch for the front panels and the hinged panels of the box-doors to provide a sufficiently thick panel on which to mount tools.

The top compartment in the bottom section is especially handy for miter-box saw which is usually too long to find convenient room elsewhere.

The drawer compartment is built separately, and slipped into place after the body of the cabinet is ready. Check the inside dimensions of the section into which it goes to be sure clearance is allowed so it will slip into place. This method of making drawer compartments of plywood is much simpler and stronger than the conventional mortise and tenon method.

Drawer opening partitions are made of plywood.

The cabinet may be finished in any number of decorative treatments. A simple and inexpensive finish is stain, of color choice, and wax, or the plywood left natural with shellac and varnish applied.



Resinous Bonded Hot Plate Plywood for Outdoor Uses

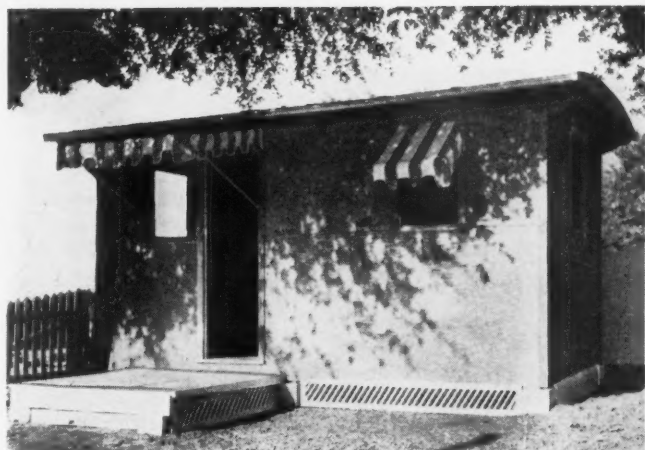
THE importance which plywood has attained as a building material is evidenced by the five-fold increase of the productive capacity of the industry in just a few years. That this industrial growth has been possible indicates the essential merit of the product and the enterprise of the manufacturers in this industry.

Once the building trades and the various re-manufacturing industries discovered the advantages of laminated wood panels in various types of construction, it was only natural that a product which performed so satisfactorily in so many places should be offered and accepted for use for purposes beyond its ability to perform. The need for a fir plywood which would have positive and guaranteed resistance to all moisture exposure prompted laboratory research by progressive manufacturers. Resinous bonded hot plate fir plywood was developed, proved by actual usage, and finally marketed under a guarantee that the plies would not separate under any moisture conditions.

This opened up a field previously closed to ordinary plywood, for, in addition to producing an absolutely waterproof plywood, the binder was found to be proof against attacks of termites and fungi. The same economies which have made fir plywood so acceptable for interior purposes were now available for exterior uses.

Faced with rapidly rising construction costs, numerous research agencies in their efforts to provide low cost housing found this new weatherproof product ideal.

Houses with plywood exteriors, some with plywood roofs, entirely prefabricated, semi-prefabricated or built on the job, ranging from small summer cabins to palatial residences have appeared in all sections of the country during this past year. This outside use has been made possible by resinous bonded hot plate plywood.



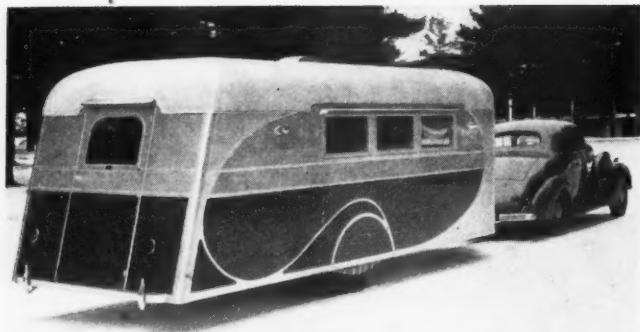
NEW type portable cottage developed at Jacksonville, Fla., built almost entirely of outdoor plywood. Many other types of plywood cabins are gaining popularity.

The modernistic effect that previously was confined to interiors can now be obtained for exteriors by bending the plywood into graceful curves. This has proven a boon to architects in both remodernization and new construction. One application of this has been in the modernization of dealer's offices and yards.

While waterproof plywood is vitally necessary to the building trade, it is likewise indispensable to the manufacturer who offers a product which must stand up under extreme moisture conditions. This new material has been readily accepted by the large car manufacturers who furnish the buses for nation-wide travel. It has made their buses lighter, stronger and more comfortable.



MODEL home in California. Outside walls of outdoor plywood; joints covered with aluminum batten strips. With waterproof joints architects are finding many new designs entirely practical.



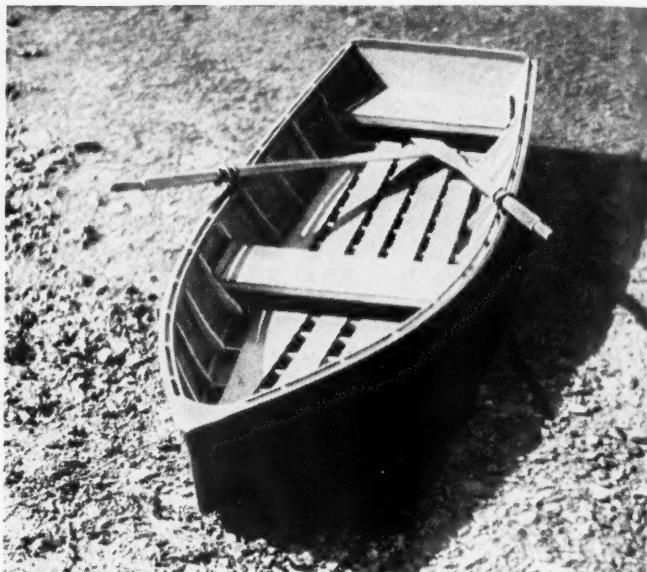
OUTDOOR plywood gives strength and durability to the trailer models of this and other manufacturers.

The better class trailer manufacturers also use it in their construction. Its lightness, flexibility and strength, combined with its resistance to weather, makes waterproof plywood ideal material for this purpose.

Only a little over a year ago, the first announcements were made about hot plate resinous bonded fir plywood. Naturally, with the cooperation that has been extended by the editors of *American Builder* and other magazines, there have been numerous requests to the manufacturer for additional information about the product. One request has been most interesting. It would seem that almost everyone has a special lake or river that he is just bound to explore. No matter what other information they want, a great majority of the inquirers wish to know whether it can be used to build a boat. The answer is that it is used not only for small rowboats but for good-sized cruisers and several collapsible types are now being offered—all with guaranteed waterproof plywood.

There are many new uses developing every day—for instance, pallets upon which to cure concrete blocks or "soft mud" bricks. Contractors tried steel, glass, hardwoods, but they all lacked something. But the resin bonded plywood filled the bill.

For concrete form material, there is great economy when the job is a multiple one, where the same form can be used a large number of times. With resin bonded



INTO boats all over the United States go carloads of outdoor plywood.

plywood concrete forms will still be serviceable after 30 to 50 re-uses.

All signs point to a rapidly expanding market for this new product. Outdoor signs are beginning to lead the way. Here's an outlet which may eventually take all that can be manufactured. The outdoor sign is a natural for hot plate resin bonded plywood—stronger than any other material pound for pound, corrosion proof, fungus proof, termit proof, waterproof, takes paint better, will not chip off, can be worked into any shape desired. The progressive sign people will soon be using guaranteed weatherproof plywood for a wide variety of purposes.

And so—hot plate resin bonded plywood carries on—out in the open—impervious to weather conditions—accomplishing new economies in building and manufacturing—creating new products—carries on from the point where ordinary plywood leaves off.



ANOTHER "natural" use for outdoor plywood—all signs exposed to the weather.

GRADE USE GUIDE

Douglas Fir Plywood, Manufactured and Graded Under Rules and Supervision of Douglas Fir Plywood Association, Tacoma

Inspection

The manufacture and grading of Douglas fir plywood is supervised by the inspection department of the Douglas Fir Plywood Association. This insures a uniform high standard of Douglas fir plywood from all manufacturers who are members of the association.

As the plywood comes from the mill, each piece is rigidly inspected by expert graders and placed in its proper quality class. The work of these graders in association mills is checked currently by official association inspectors, to assure that each mill grades its plywood uniformly in accordance with published

association rules (U. S. Department of Commerce, Commercial Standard CS45-36). Their chief duty is to see that a high standard of grading and inspection is maintained. The inspectors furnish daily reports to the mill superintendent and to the association, on manufacture and workmanship as they affect grades.

An official inspection certificate which certifies that the plywood from the association mill has been inspected and found to comply with the grade specifications of the association grading rules (U. S. Department of Commerce, Commercial Standard CS45-36) is furnished where requested and can be obtained by buyers so specifying from any manufacturer who is a member mill of the Douglas Fir Plywood Association.

Recommended Grades of Douglas Fir Plywood

Grade Names Refer to Standard Grading Rules of Douglas Fir

Plywood Association and to U.S. Commercial Standards, CS45-36

1. Buildings, Light Framed or Light Joisted Construction, Rough Carpentry

USE-ITEM	GRADES RECOMMENDED	THICKNESS Commonly Used
Walls and Partitions		
Sheathing	Sheathing or WB (unsanded)	5/8", 3/8", 5/16" 9/16", 7/16"
Floors and Roofs		
Subflooring	Sheathing or WB (unsanded)	5/8" 9/16", 7/16"
Roof Sheathing	Sheathing or WB (unsanded)	5/8", 5/16" 9/16", 7/16"
Roof Decking, Flat Covered	Sheathing WB (unsanded) SO2S (unsanded)	5/8" 9/16" 3/4" or more
Cellar and Attic, Treads and Risers	WB or SO2S	9/16" 5/8"

2. Buildings, Heavy Framed, Heavy Joisted, or Heavy Timbered Mill Construction, Rough Carpentry

USE-ITEM	GRADES RECOMMENDED	THICKNESS Commonly Used
Plank Decking, Floors and Roofs, Tongued and Grooved, or Splined	SO2S (milled as desired)	5/8" and thicker
Subflooring	SO2S	5/8" and thicker
Partitions (tongued and grooved or splined)	SO2S (milled as desired)	5/8" and thicker
Partitions (stud framed)	(For lining, see 1)	
Stair Treads and Risers	SO2S	5/8" and thicker
Heavy Shelving	SO2S	5/8" and thicker
Roof Trusses		
Gusset Plates	Special Mill Order	

3. Buildings, Framed, Joisted, or Heavy Timbered Mill Construction, Exterior Finished Carpentry and Millwork

USE-ITEM	GRADES RECOMMENDED	THICKNESS Commonly Used
Ceiling (porch)	Special Concrete Form Stock	1/4", 3/8"
Exterior Wall Panels	G1S (resin-bonded)	3/8" and thicker

4. Buildings, Fireproofed Construction, Rough and Exterior Carpentry

USE-ITEM	GRADES RECOMMENDED	THICKNESS Commonly Used
Subflooring	Sheathing SO2S	5/8" 5/8" and thicker
Roof Decking, Flat Covered	WB or SO2S or Sheathing	1/2" 1/2" and thicker 5/8"

5. Buildings, Framed, Joisted, Heavy Timbered Mill, or Fireproofed Construction, Interior Finished Carpentry, Millwork and Cabinet Work

USE-ITEM	GRADES RECOMMENDED	THICKNESS Commonly Used
Finished or Top Flooring		
Attics, Closets, Storerooms	WB or SO2S	1/2" (or 9/16" unsanded) 9/16" and thicker

Covered Floors	Sheathing WB or SO2S	5/8" 1/2" (or 9/16" unsanded) 9/16" and thicker
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Finish and Trim

Attic Stair Treads or Step-ping and Risers	WB or SO2S	1/2" 9/16" and thicker
Wall or Ceiling Surfaces or Paneling	WB G1S	1/4", 3/8", 1/2" 1/4" and thicker
Ceiling, Partition, and Closet Lining	WB G1S	1/4", 3/8", 1/2" 1/4" and thicker
V-jointed or Other Milling	As Ordered	
If Both Sides Exposed	SO2S or G2S	1/4" and thicker 1/4" and thicker
Ceiling, Beams, Built Up	WB or G1S	1/4" 1/4"
Shelving, Light	WB or G1S	3/8", 1/2" 3/8" and thicker
Shelving, Store	SO2S	1/2" and thicker
Counter Tops	G1S	As desired

13. Stadiums, Grandstands and Bleachers

USE-ITEM	GRADES RECOMMENDED	THICKNESS Commonly Used
Roof Decking	Sheathing WB	5/8" 1/2" (or 9/16" unsanded)
Seats and Seat Backs (under roof)	Concrete Form Panels (specially cut to size)	As desired
Wall Covering (interior)	WB or SO2S	1/4", 3/8" 1/4" and thicker

17. Towers and Derricks

USE-ITEM	GRADES RECOMMENDED
Gusset Plates	Special Mill Order

19. Billboards and Signs

USE-ITEM	GRADES RECOMMENDED	THICKNESS Commonly Used
Panels	WB (resin-bonded) or G1S (resin-bonded)	As desired As desired

21. Concrete Forms

USE-ITEM	GRADES RECOMMENDED	THICKNESS Commonly Used
Boarding and Panels	Concrete Form Panels	1/2", 9/16", 5/8", 11/16", 3/4"
Form Lining { (one use) (reuse)	WB SO2S Made with Concrete Form Glue	1/4" 1/4"

26. Sidewalk Protection

USE-ITEM	GRADES RECOMMENDED	THICKNESS Commonly Used
One Use	Sheathing	5/8"
For Reuses	Concrete Form Panels	5/8", 11/16", 3/4"

27. Studio, Stagecraft, Convention Booths, Cutout Displays

GRADES RECOMMENDED
WB or as desired

28. Temporary Fronts

GRADES RECOMMENDED	THICKNESS Commonly Used
WB or SO2S	1/4" and thicker 1/4" and thicker

Glossary of Terms and Abbreviations

In design, on plans and in purchase specifications, it is convenient to use abbreviations. Terms and abbreviations for Douglas fir plywood are at times somewhat different from those used in lumber and accordingly are presented below:

Abbreviations

G2S.....	Good 2 Sides
G1S.....	Good 1 Side
SO2S.....	Sound 2 Sides
WB.....	Wallboard
No. 1DP.....	No. 1 Door Panel
No. 2DP.....	No. 2 Door Panel
S2S.....	Sanded 2 Sides

Glossary of Terms

Centers—See Cores.

Checks—Small splits running parallel to the grain of the wood caused chiefly by strains produced in seasoning.

Cores—A core or center is the innermost layer in plywood construction.

Crossbanding—Veneer used in the construction of plywood with five or more plies. In 5-ply construction it is placed at right angles between the core and faces.

Defects, open—Checks, splits, open joints, cracks, loose knots, and other defects interrupting the smooth continuity of the panel surface.

Heartwood—Sometimes referred to as "heart"—the darker-colored wood occurring in the inner portion of the tree.

Knots—Cross section of a branch or limb whose grain usually runs at right angles to that of the piece in which it is found.

Knot holes—Voids produced by the dropping of knots from the wood in which they were originally embedded.

Lap—A condition where the veneers used are so misplaced that one piece overlaps the other rather than making a smooth butt joint.

Patches—Insertions of sound wood glued and placed into panels from which defective portions have been removed.

Pitch-pockets—Well-defined openings between rings of annual growth, usually containing, or which have contained, more or less pitch, either solid or liquid.

Pitch streaks—A streak is a well-defined accumulation of pitch in a more or less regular streak.

Sapwood—Sometimes referred to as "sap"—the lighter colored wood occurring in the outer portion of the tree.

Shim—A long, narrow patch not more than $\frac{3}{8}$ inch wide.

Streaks—See Pitch streaks.

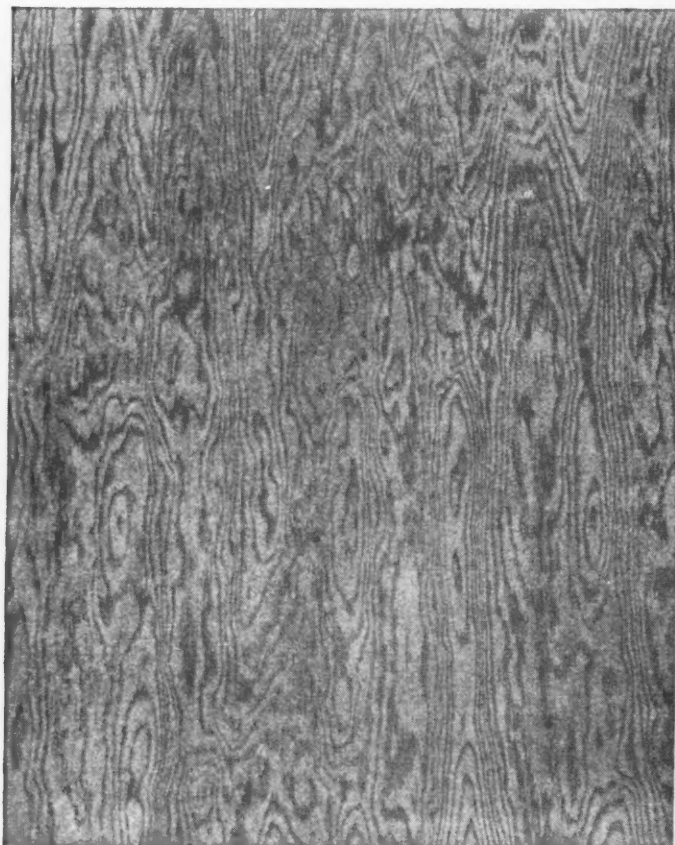


FIG. 1

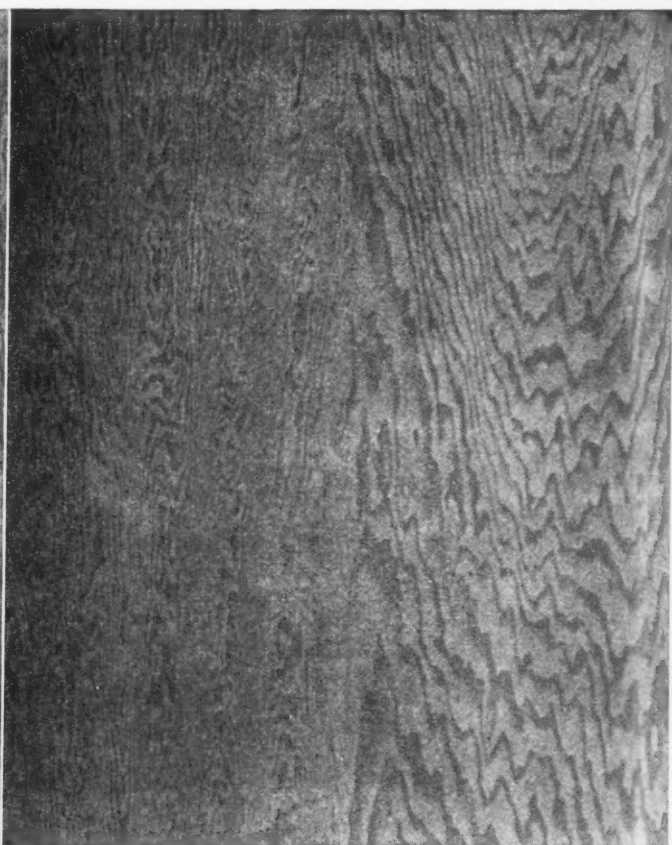


FIG. 2

Figure 1 shows a typical face in a Good 1 Side panel; figure 2 shows a Sound "face." This particular one consists of two narrow pieces glued side by side; only the variation in grain reveals the perfectly fitted joint. It is intended that above illustrations be representative of the grade, but not necessarily to establish limits.

GRADE G1S

DESCRIPTION

One face is as good as the faces in a G2S grade, while the opposite face or back is a "Sound" face, as described under the next grade.

USES

Also suitable for highest quality of wall paneling, ceiling, partition or other surface where only one face is exposed, or where the back is only occasionally exposed. Light or dark stains, lacquers, waxes, etc., offer a variety of finishes.

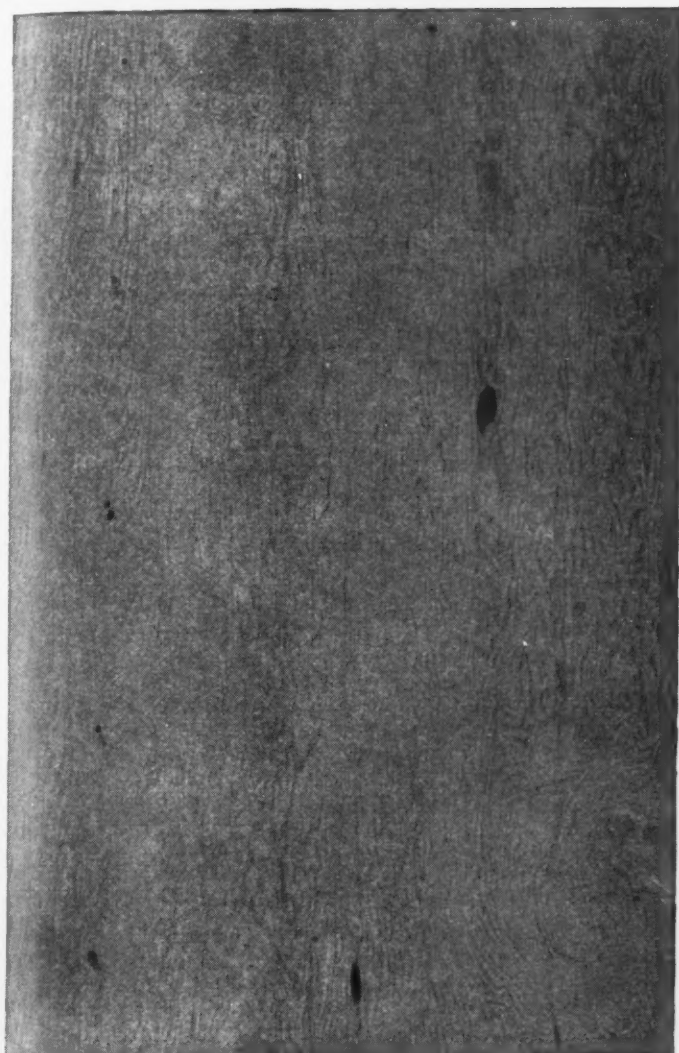


FIG. 3

Figure 3 shows the reverse side or "back," of a typical Wallboard grade of panel which has sufficient knots, etc., to prevent economical patching. It is intended that above illustration be representative of the grade, but not necessarily to establish limits.

GRADE	DESCRIPTION	USES
Wallboard	Really a SOUND 1 SIDE panel. One face is equal to the face of an SO2S panel, while the back contains sufficient defects, such as knots, splits, pitch pockets, etc., as to render it unfit for patching.	Probably the most popular plywood grade, where only one face is to be exposed. Suitable for walls, ceilings, partitions or other surfaces that are either to be painted, or papered, or to have a natural or stained finish in which minor blemishes will not be of serious consequence.

GRADE	DESCRIPTION	USES
Concrete Form Panels	Panels manufactured with special highly water-resistant glues, and designed to give numerous reuses and smooth unblemished surfaces.	For Concrete Forms and where water-resistant service is desired.

TABLE OF SIZES AND THICKNESSES OF STOCK PANELS

ITEM	WIDTHS	LENGTHS	THICKNESSES
Standard Panels	From 12", increasing by 2-in. units to 30"; also 36", 42", and 48"	48", 60", 72", 84", and 96"	3/16" (3-ply sanded 2 sides) increasing by 1/16" thicknesses to 1-3/16" (7-ply)
Wallboard	30", 32", 36", and 48"	60", 72", 84", and 96"	3/16" unsanded; 1/4", 5/8", 3-ply sanded 2 sides; and 1/2" 5-ply sanded 2 sides
Sheathing	48"	60", 72", 84", and 96"	5/16" and 3/4" 3-ply unsanded and 1/2" 5-ply unsanded

(Larger or odd size panels may be secured on special order)

Concrete Form Plywood—Concrete form plywood shall be built up of three or five thicknesses of veneer, of which the two outside plies are at least 1/8 inch thick before sanding. An occasional knot hole is permissible in the center or core of 5-ply panels only but no knot holes are permitted in cross banding.

Faces shall be free from knots or open defects. The glue used shall be especially prepared for this purpose and be very highly water resistant. All concrete form plywood shall be so designated by grade-marking each panel. (When so ordered, concrete form plywood will be treated with a satisfactory form oil or other preparation.) (GS45-36)

Sizes and Thickness of Douglas Fir Plywood

Douglas fir plywood comes in stock panels up to four feet in width and eight feet in length, but larger panels may be obtained upon special order.

In thickness, fir plywood is manufactured from 3/16" (which may be sanded to 1/8") up to 1 3/16" in increments of 1/16". Greater thicknesses as required may be obtained for gusset plates and other special uses.

There is a suitable grade and an economical thickness of Douglas fir plywood for almost any use.

By gluing together the veneer so that alternate sheets have their grain running at right angles, the manufacturer of Douglas fir plywood capitalizes on the strength of wood along the grain.

Along the grain, wood has a tensile strength and stiffness many times greater than it has across the grain. Furthermore, wood has practically no expansion or contraction along the grain.

Consequently, through alternating the grain direction of the veneer sheets, fir plywood acquires longitudinal grain both lengthwise and crosswise and with it great strength and stiffness in all directions. At the same time, the stability of each sheet along the grain, plus the assured glue bond, prevents the adjacent sheets from shrinking or expanding when subjected to heat or dampness, resulting in plywood panels practically immune against expansion or shrinkage.

All stock panels of Douglas fir plywood are manufactured with water-resistant glue.

Concrete Form Panels are made with special water-resistant glues to assure numerous reuses under severe moisture conditions.

Supplementing such plywood products is the strictly waterproof Douglas fir plywood, manufactured with synthetic resin glues and hot pressed.

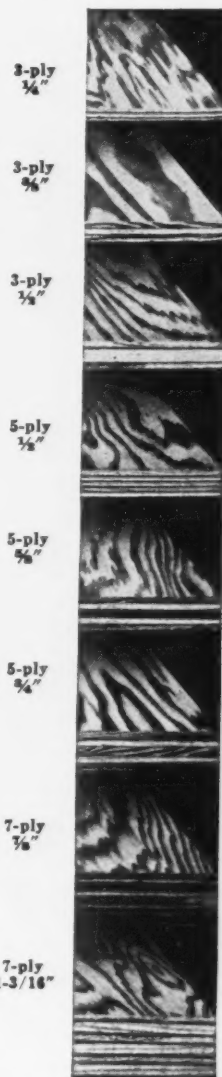


FIG. 4—Representative plies and thicknesses

Structural Data

Bending and Deflection

Douglas fir plywood is made from thin sheets or plies of Douglas fir wood, laid alternately at right angles to one another, and bonded together with glues that are stronger than the wood itself. Consequently, for those plies having their grain parallel to the span, the same modulus of elasticity as for Douglas fir lumber is used, e. g.,

$E = 1,600,000$ lbs./sq. in.—Numerous tests substantiate this value.

With this value, the deflection of a panel or piece of Douglas fir plywood may be computed readily from the standard deflection formulae.

I, the moment of inertia of the cross-section, however, is computed by considering only those plies that have their grain direction parallel to the span.

In a 5-ply, $\frac{5}{8}$ " panel, for example, assuming it consists of plies shown in figure 12, ignore the two cross-bands, c and c, and hence,

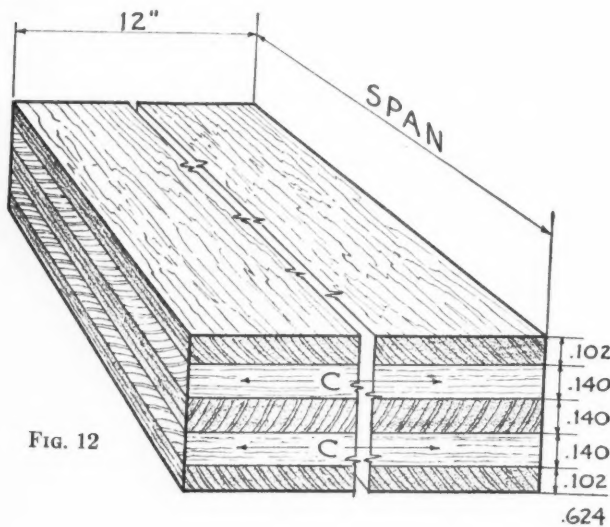


FIG. 12

$$I \text{ (for 12" width)} = \frac{12}{12} \left[\frac{5^3}{8} - (3 \times 0.14)^3 + 0.14^3 \right]$$

or, $I = .173 \text{ in.}^4$

If the grain of the face plies runs at right angles to the span then only the cross-bands, "c", would be considered in computing the

$$I = \frac{12}{12} \left[(3 \times 0.14)^3 - 0.14^3 \right] = 26 \times 0.14^3 = .071 \text{ in.}^4$$

Below is a table of moments of inertia for various thicknesses of plywood. There are minor differences in the thickness of fir plywood veneers used by the various manufacturers, but the values in the table are based on the minimum assemblies and hence are conservative.

TABLE I

(Grain of face plies parallel to span)

Thickness	I (for 12" width)	S
5/16" — (3 equal plies).....	.029	.186
3/8" — (3 plies @ $\frac{1}{8}$ ").....	.051	.270
1/2" — (3 ply).....	.090	.360
5/8" — (5 ply 1/11", $\frac{1}{8}$ ", 3/16", $\frac{1}{8}$ ", 1/11").....	.167	.535
3/4" — (5 ply).....	.250	.667
1" — (7 plies @ 1/7").....	.713	1.426

Based on numerous flexural tests at the University of Washington Forest Products Laboratory, on samples taken at random from practically all the fir plywood mills, the following range of values was obtained:

Modulus of rupture: 8,500 to 15,200 lbs./sq. in.

Fibre Stress at Proportional Limit—6,900 to 9,800 lbs./sq. in.

Tension and Compression

In order to present a general comparative picture as to the strength properties of Douglas Fir Plywood, and other materials sometimes used in its place, the results of a series of tests conducted at the Northwest Testing Laboratory, the Northwest representative of the nationally-known Pittsburgh Testing Laboratory, are summarized below:

In the tension tests, all specimens were 3" x 18"; in the compression tests, 6" x 6" pieces were used. Tests on each material were conducted under exactly the same conditions.

Thickness of material	Tension		Compression	
	Ultimate load	Ultimate stress	Ultimate load	Ultimate stress

LOAD ACTING WITH THE GRAIN OF FACE PLYS

1/4", 3-ply	5250	6484	4198	2855
3/8", 3-ply	5644	4750	6630	2860
1/2", 5-ply	8024	5135	10492	3497
5/8", 5-ply	8132	4350	10644	2893
3/4", 5-ply	8912	4074	18538	4186

LOAD ACTING ACROSS GRAIN OF FACE PLYS

1/4"	2552	3291	908	609
3/8"	4684	4141	5206	2180
1/2"	7664	5108	6462	2162
5/8"	8326	4491	9096	2472
3/4"	8796	3932	15262	3436

TESTS ON OTHER MATERIALS

A-3/16"	1248	2189	390	346
B-3/16"	1276	2180	846	751
C-1/4"	264	352	826	550
D-7/16"	152	126	448	170
E-1/2"	370	248	690	230

Key: Material A, old-style fibre wallboard; B, hard, compressed board C, plaster-board; D and E, insulating boards.

Sheathing

Tests conducted at the United States Forest Products Laboratory, Madison, Wisconsin, have established that thin Douglas fir plywood is suitable for use as sheathing. The tests on 9' by 14' wall panels indicated that $\frac{1}{4}$ " plywood SHEATHING well nailed to a stud frame was more than adequate in both rigidity and strength. The same kind of plywood glued to a similar stud frame proved to have markedly superior rigidity and strength properties.

5/16" Plywood Suitable as a Shingle Base

Tests completed in the spring of 1937 at the University of Washington's Forest Products Laboratory, under the supervision of Professor Bror L. Grondal, recognized shingle authority, showed that it required a force of 85 pounds (minimum) up to 125 pounds to pull an 8-inch red cedar shingle (one of a panel of shingles applied in accordance with standard practice) from 5/16" fir plywood.

This force is equivalent to a wind pressure of nearly 300 pounds per square foot, a force greater than that of a hurricane. The reason for 5/16" Douglas fir plywood's suitability as a shingle base is that plywood holds the shingle nails with a greater force than that required to pull the nail heads through the shingles.

Professor Grondal, Special Consultant for the Red Cedar Shingle Bureau, and co-author of their Official Handbook, has approved 5/16" Douglas fir plywood as a base for shingles.

SUPER-Harbord

THE NEW RESINOUS BONDED HOT PLATE
—PLYWOOD—

FOR ALL OUTDOOR PURPOSES

In this new type of outdoor plywood, The Harbor Plywood Corporation has developed a laminated wood panel that is absolutely guaranteed against separation of plies.

Its durability and weather resisting qualities are due:

1. To the patented resinous binder with which the plies are united.
2. The modern hot-plate press which, through heat and tremendous pressure applied simultaneously, welds the plies together, to form, in effect, one solid piece of lumber with all the advantages of lamination.

From every standpoint it is an advanced product—in lighter weight, greater strength, smoother surfaces, higher durability under all conditions, in positive weather-proof qualities and resistance to molds, fungi and insects through rot-proof binder.

SUPER-Harbord can be used advantageously wherever ordinary plywood can be used and to far greater advantage in all outdoor uses and other special uses where the wood is subjected to extremes of temperature, bad weather conditions and insect infestations.

Specifically, SUPER-Harbord is specially adapted for every form of outdoor construction—walls, roofs, sheathing, etc.—for boat-building, outdoor signs, cabins, camps, gas stations, bus or truck bodies, and countless similar uses.

For concrete forms it is used under the name SUPER-Harbord Plycrete, where it offers many more re-uses due to water-proof quality and harder surfaces.

On the following pages examples of some of these special uses will be found.



THE OUTDOOR PLYWOOD

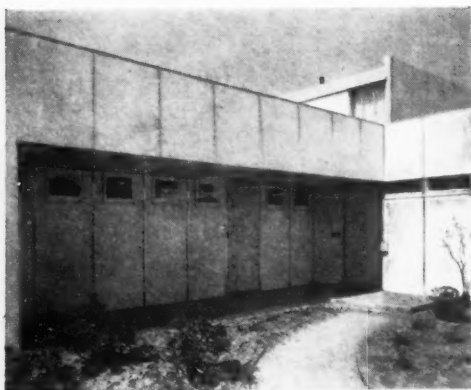
SUPER-Harbord

Gives you what



SMALL CABINS

Sturdy, serviceable cottages and cabins built almost entirely of plywood inside and out have been made possible at low cost by the use of SUPER-Harbord. The one shown in the illustration developed in Cleveland uses $\frac{1}{4}$ " SUPER-Harbord for the walls with $\frac{5}{16}$ " sheathing sub-floors with a $\frac{1}{2}$ " SUPER-Harbord floor on top.



MODERN EXTERIORS

Modernistic effects and the popular "streamlining" of exteriors are now practical through the flexibility and weather resistance of SUPER-Harbord. In this ultra-modern house in Los Angeles, $\frac{3}{4}$ " SUPER-Harbord was used on the outside and $\frac{5}{8}$ " mahogany on the inside. Attractive paneling effects and graceful curves are combined in this construction.



STORE FRONTS

The modernization of store fronts and offices has been simplified through the use of SUPER-Harbord. As in residence construction, this pliable, weather-proof material lends itself to straight, smooth surfaces and also to clever effects in curves when desired. In the building shown, erected at Aberdeen, Washington, the walls are $\frac{3}{4}$ " SUPER-Harbord, 48" x 48" panels, shiplapped four edges reversed and a slight bevel on the four face edges.

SUPER-Harbord IS GUARANTEED

you've always expected **OF PLYWOOD**

A WEATHERPROOF • TERMITEPROOF BUILDING MATERIAL

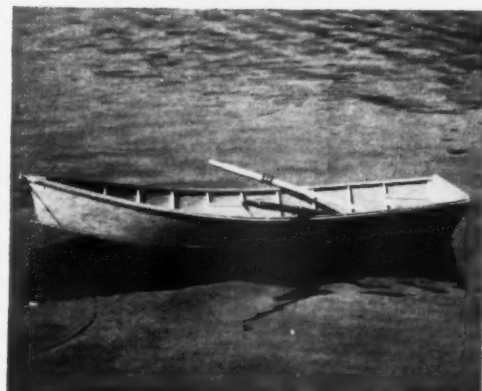
BUSES

Manufacturers of buses and trucks such as Bender Body Company and J. G. Brill Company, are finding marked advantages in SUPER-Harbord for this purpose. Its lightness, strength and the way it stands up under extreme weather conditions are revolutionizing this type of construction. Stronger, sounder floors for buses are made of $\frac{5}{8}$ " and also 1" and $1\frac{1}{4}$ " SUPER-Harbord. Truck bodies and bodies for delivery cars are made more sturdy and weatherproof with SUPER-Harbord.



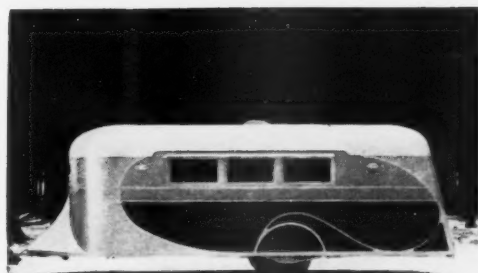
BOATS

Boat builders from Atlantic to Pacific have seized upon SUPER-Harbord as ideal material for the extreme moisture conditions encountered by boats. Not only decks, cabin framing, instrument boards, lockers, etc., in cruisers and motorboats are made from SUPER-Harbord, but rowboats, folding boats, and kyaks utilize this material. In the SUPER-Harbord rowboat pictured here $\frac{3}{8}$ " SUPER-Harbord was used for sides and bottom. A few of the manufacturers using SUPER-Harbord are Barbour Boat Works, Owens Yacht Company, St. Helens Manufacturing Company, Mead Gliders.



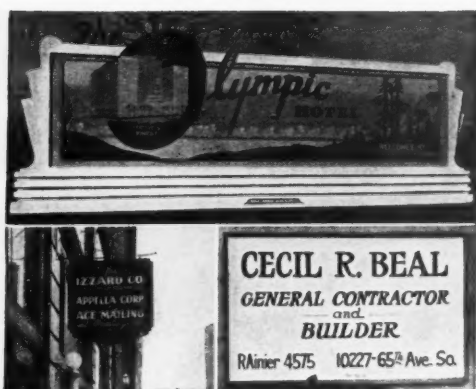
TRAILERS

The rapid demand for trailers has opened a wide field for SUPER-Harbord in their construction. Some of the finest de-luxe trailers utilize this strong, light, weather-proof material in frame, floor and side walls. The lower moisture content makes panels of SUPER-Harbord more workable. The fact that it is proof against rot, mold and termites, makes it particularly valuable in regions where these are prevalent.



AGAINST P L Y S E P A R A T I O N

SUPER-Harbord *Baffles the Elements*



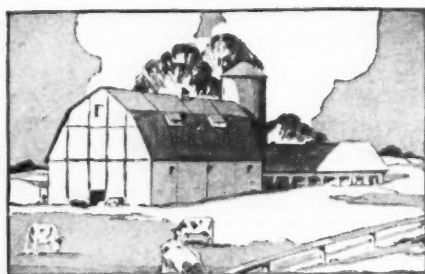
SIGNS

Ideally suited to outdoor sign construction SUPER-Harbord is being used effectively for Store Front signs—outdoor advertising, bulletins, "A" signs, animated figure signs, real estate signs and a wide variety of displays. For small signs $\frac{3}{8}$ " SUPER-Harbord is recommended, while for larger signs $\frac{5}{8}$ " and $\frac{3}{4}$ " should be used. The ease of working, permanence, weather resistance and ultra-smooth finish surfaces make for economical construction.



CONCRETE FORMS

Modern contractors have found in SUPER-Harbord Plycrete an efficient form material. Because of its harder wood surface it presents a harder, smoother face to the concrete. The plies being fused together with a binder insoluble in water, the panels may be re-used many times—often as many as forty or fifty times. In the Kerns' Construction shown in the illustration, $\frac{5}{8}$ " SUPER-Harbord was used.



FARM BUILDINGS

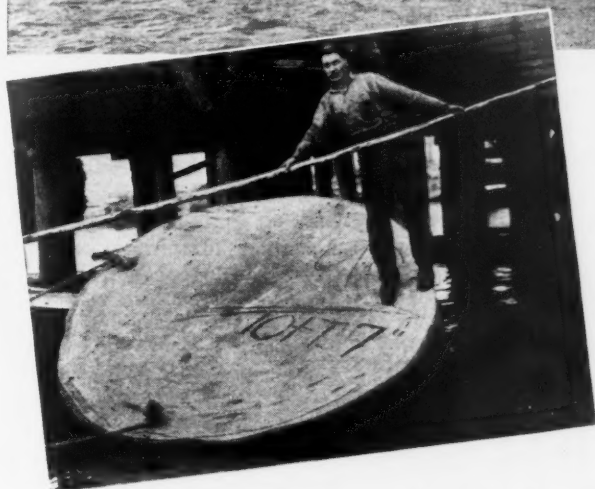
New homes or repairs to the old one—new barns, sheds, outhouses of any kind can now be made better, quicker and more attractive by using the new SUPER-Harbord. Its lightness, large panels, resistance to mold, fungi and termites—plus the ability to stand up against outdoor exposure make it the ideal material for dozens of farm uses. The ease with which it can be worked appeals to home carpenters as well as to professional builders and contractors.

For detailed information about various uses for SUPER-Harbord, write to

HARBOR PLYWOOD CORPORATION
MILLS AND GENERAL OFFICES
HOQUIAM, WASHINGTON

THE OUTDOOR PLYWOOD

Only Choice Logs



Only the most select Douglas Fir logs are picked for APCO Plywood. These choice logs, found only on our own timber land in western Oregon and Olympic Peninsula, measure from 6 to over 10 feet in diameter. These giant Douglas Firs are loaded on specially constructed steel barges and brought around to our harbor and mills where they are prepared for peeling. The peels or plys that make up APCO Plywood are rigidly inspected—only the perfect ones reach the press. That's why APCO Douglas Fir Plywood is first choice among builders everywhere. Try it on your next job. It comes in all standard grades and thicknesses.



ABERDEEN PLYWOOD CO.
ABERDEEN - - - - WASHINGTON

for

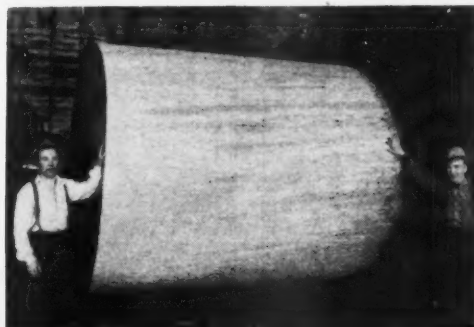


WE ALSO MANUFACTURE

A SPRUCE FACE PLYWOOD WHICH IS IDEAL FOR PAINTING BECAUSE OF THE SMOOTH UNIFORMITY OF GRAIN AND SURFACE TEXTURE. WRITE FOR INFORMATION ON APCO PLYWOOD WITH OTHER THAN FIR FACES.

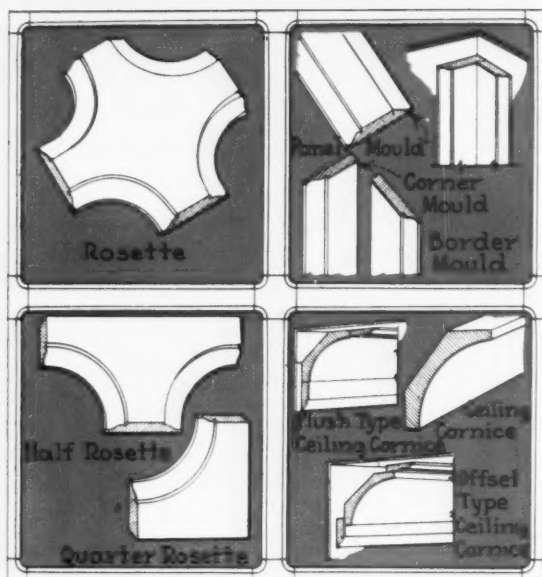
ASK YOUR DEALER FOR
Apco DOUGLAS FIR PLYWOOD

READY FOR THE PEELER



the DRI-BILT

CONTRACTORS! DEALERS!



It's Sensational!

By using DRI-BILT construction methods, as presented by the Washington Veneer Company, you can build and sell sturdier, better houses at lower prices. You can build for people who want low cost houses, or you can offer beautiful interiors and exteriors in luxury homes at prices that will make them easy to sell.

You can build and sell DRI-BILT Houses one at a time in the usual way. You can pre-cut them, or can prefabricate them in quantity and put them up on prepared sites. You need no elaborate machinery, no factory, no large selling organization, and can use familiar materials. The secret of DRI-BILT economy is that you use conventional materials in new ways.

Westboard Panels and Trim

DRI-BILT interior walls and ceilings are made with WESTBOARD Panels for natural finish, stain, paint, plastic paint, canvas, or paper, with invisible glue joints. We show you how.

Paneled walls and ceilings, made with WESTBOARD Mouldings and Rosettes, give the beauty and finish of expensive moulded plaster panels and coves, in a wide variety of shapes and designs. These walls and ceilings are being built in luxury homes today, yet they cost so little that they are being used to sell low-cost houses.

WESTBOARD Trim opens new opportunities to contractors and dealers. They enable you to produce beautiful, sturdy, crack-proof paneled walls and ceilings, with no wasted drying time, at a fraction of their former cost.

SEE YOUR DEALER

Ask your lumber dealer about DRI-BILT Walls made with WESTBOARD Panels and Trim. Ask him about the DRI-BILT House. If he does not have the information, ask him to send for the booklet shown on the facing page—or send for it yourself. It tells how to build and sell DRI-BILT Houses and DRI-BILT interiors.

WASHINGTON
OLYMPIA,

House is Here!

THIS BEAUTIFUL HOUSE

is built the DRI-BILT Way. DRI-BILT Houses are *new* but they are being built and sold by contractors and lumber dealers in all price ranges from \$3,500 to \$20,000. DRI-BILT specifications have been approved by both government and private financing agencies.



What is DRI-BILT?

Standardized methods and standard sizes of conventional materials are used in DRI-BILT Houses, yet there is nothing standardized about their appearance. They can be built from your own plans, with or without a basement. DRI-BILT Houses use familiar materials carried by lumber dealers. They have variety of design, colors, and architectural effects, with conventional floors, walls, roofs, interiors, exteriors. There are no extra forms, equipment, or gadgets to buy.

The DRI-BILT House was developed by Jacques Willis, exclusive representative of Washington Veneer Co., and

also, pioneer advocate of dry construction. A few simple working drawings and a brief explanation will show you the difference between ordinary and DRI-BILT construction, and will show you why DRI-BILT Houses are so sturdy, so attractive, yet cost so little.

Contractors and dealers working together, one furnishing labor, the other furnishing materials, can build and sell, pre-cut, or prefabricate DRI-BILT Houses, singly or in quantity. By using WESTBOARD Panels and Trim they can build and sell sturdier, better houses for less money.

LET Jacques Willis
tell you about DRI-BILT

Jacques Willis, of the C-W Plywood Company, Chicago, exclusive representatives of Washington Veneer Co., developed and perfected the DRI-BILT House, with a complete plan for building and selling it. Contractors and dealers are using these plans to build and sell these houses today. Mr. Willis is known all over the country as a pioneer of dry-wall construction, and is one of the best informed men in the industry on its economies and advantages. Send the coupon on the right with 20c in coin or stamps to cover cost of printing and mailing, and a copy of the booklet "How to Build and Sell the DRI-BILT House" will be sent to you. It is complete, with working drawings and a full explanation of DRI-BILT Methods.



MAIL THIS COUPON

WASHINGTON VENEER CO.

Olympia, Washington

You will find enclosed 20c in {Stamps..... for which
Coin.....} please send a copy of your booklet "How to Build and Sell the DRI-BILT House."

Name

Address

City

State

VENEER CO.
WASHINGTON

Plywood steps ahead again— First **WATERPROOF GLUES**

*I. F. LAUCKS, Inc. — first in Plywood Progress
since the first fir plywood was made*



FIRST with new waterproof glues specially formulated for Fir Plywood . . . 1923.

FIRST with Glues for concrete form plywood . . . 1930.

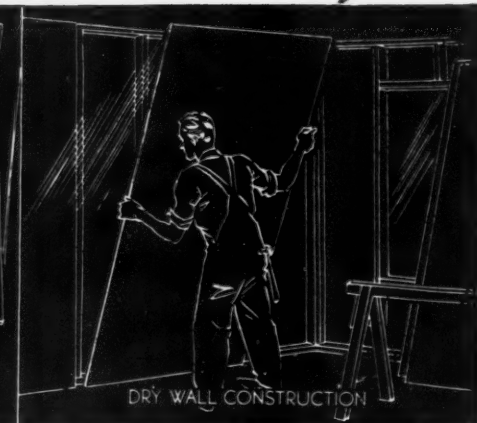
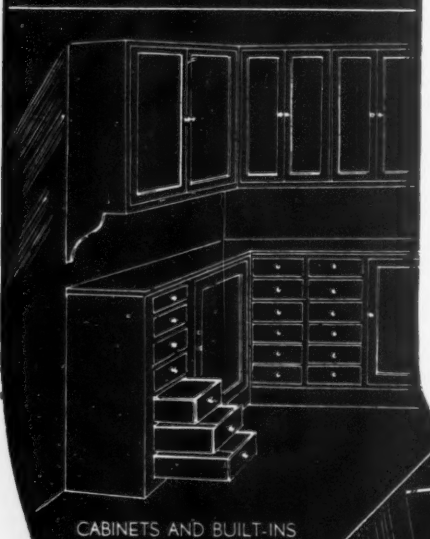
FIRST with a decorative finish specially adapted for plywood walls . . . 1927.

FIRST with a system of "dry wall" construction eliminating cracks, the Uniwall System . . . 1935.

FIRST with low heat, waterproof synthetic resin hot press adhesives and mastic glues . . . 1936.

And now **FIRST** with a factory primer and sealer, REZITE, that actually stops grain raise, waterproofs and prevents decay.

There's a Lauxein waterproof Glue for every purpose. Casein — Blood Albumen — Soybean — Synthetic Resins.



thru another Laucks development

Now, REZITE, Factory Primer

stops grain raise • waterproofs • prevents decay

"makes Fir Plywood finish like hardwood"

REZITED fir plywood is the latest development in the Douglas Fir Plywood industry . . . a revolutionary factory treatment that primes and seals the surface—imparting finishing qualities, durability, and resistance to moisture and decay, hitherto unknown.

Builders everywhere have been quick to realize the advantages of REZITED fir plywood . . . have used in a year more than twelve million feet in all types of building construction . . . walls, partitions, cabinets, paneling, furniture, concrete forms, and a multitude of new uses in the industrial field.

REZITED fir plywood *actually finishes like hardwood* . . . quickly and with a minimum of effort and expense. You can decorate it per-

fectly with paint, enamel, lacquer, oil or water stains, or other finishing materials.

REZITE acts, not like ordinary primers, but by *penetration*. It *permanently binds down the fibres* of both hard and soft wood, giving a smooth, uniform hard surface, that cannot raise in the presence of moisture. Climatic changes do not affect it; it is resistant to mold and decay; checking is minimized.

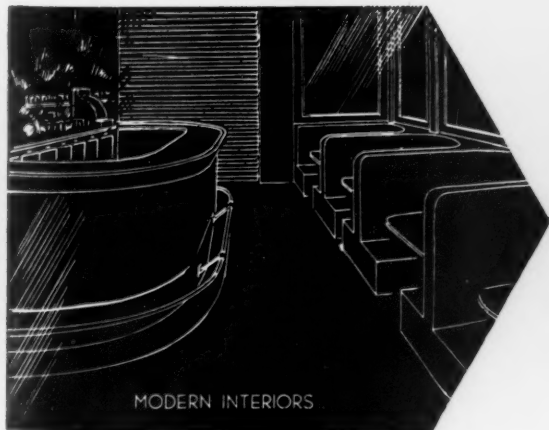
Choose your favorite brand of plywood and order it "REZITED-at-mill." Remember there is nothing else like REZITED Plywood, because nothing else stops grain raise as REZITE does.

Laux **REZ** *clear synthetic resin sealer is now available for application in the shop or on the job. Penetrates. Primes. Preserves. Protects. Makes soft wood finish like hardwood.*

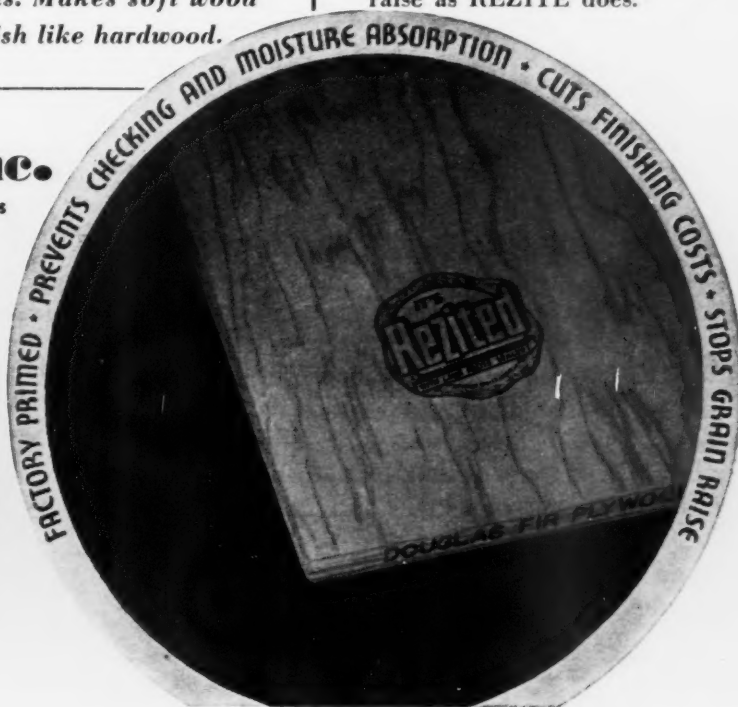
I. F. LAUCKS, Inc.

World's Largest Manufacturer of Waterproof Glues
For Every Purpose

SEATTLE



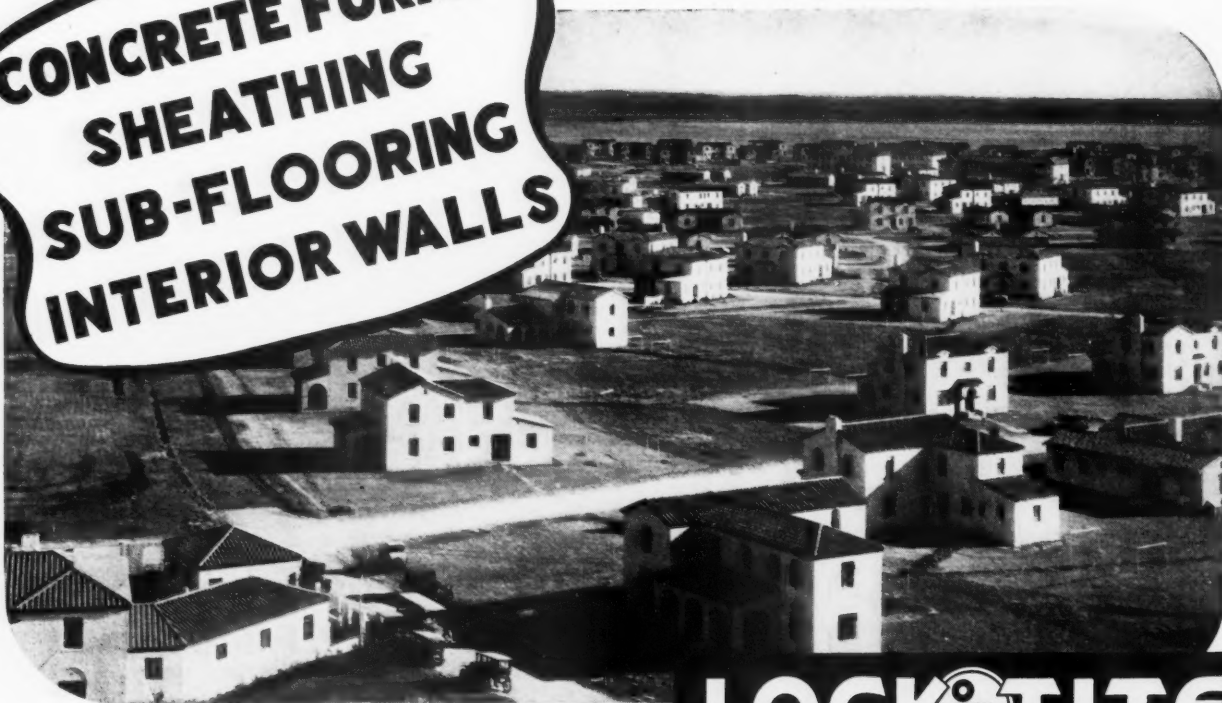
MODERN INTERIORS



LOCKTITE

DOUGLAS FIR PLYWOOD

**CONCRETE FORMS
SHEATHING
SUB-FLOORING
INTERIOR WALLS**



Officers' homes, Randolph Field, Texas. Forms for all of these concrete houses were lined with LOCKTITE Concrete Form Plywood. As a result, the finished walls had smoother surfaces, and costly rubbing was eliminated.

LOCKTITE
DOUGLAS FIR PLYWOOD

FOR FRAME BUILDINGS

Use LOCKTITE Douglas Fir Plywood for wall sheathing, sub-flooring, roof sheathing, interior walls. LOCKTITE sheathing is a good insulator. It gives added bracing strength and holds nails tenaciously.

FOR CONCRETE CONSTRUCTION

LOCKTITE Precision Made Concrete Form Plywood has been used on outstanding construction projects from Coast to Coast—the San Francisco-Oakland Bay Bridge, the Tri-Boro Bridge in New York, Post Offices in St. Louis and Chicago, Housing Projects in Chicago and New York. LOCKTITE was used because builders know that it "stands up" under punishment, gives more reuses, and pro-

duces smoother finished concrete. LOCKTITE stands up because its carefully selected veneers are bonded together with special water-resistant glues.

BUY PERFORMANCE—SPECIFY LOCKTITE

LOCKTITE Douglas Fir Plywood spans the nation. It is made in two great modern plants. Quick shipments—carefully made stock. A thickness and construction for every need.

OREGON-WASHINGTON PLYWOOD COMPANY

Two Mills—Tacoma and Everett, Washington

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Chicago
Los Angeles

107 Park Ave.,
New York
San Francisco

STRONGER THAN STEEL FOR ITS WEIGHT



DOUGLAS FIR

plant at Seattle, Wash., producing 80,000,000 sq. ft. annually of fir panels of unexcelled quality.

HARDWOOD PLYWOOD

widely diversified stocks for immediate delivery from warehouses or prompt factory shipment.

FLEXWOOD*

thin veneer mounted on cloth for direct wall application.

ARMORPLY*

metal-covered plywood carried in stock or made to engineering specifications.

WELDWOOD*

resin-bonded plywood guaranteed against separation under any conditions—a plywood for OUTDOOR use, available from stock in Douglas Fir and hardwoods—on special order, to specifications.

TECHNICAL PLYWOOD

fireproof panels
aircraft plywood
architectural plywood
pew backs
counterfronts
curved panels, etc.

*Trade Mark registered

WE MANUFACTURE and distribute Douglas Fir Plywood, Hardwood Plywood, Doors and related laminated products.

We carry the largest stocks in the world, in warehouses located in ten principal industrial centers of the United States.

Our stocks include Douglas Fir, Rezited Fir, California Pine, Mahogany, Birch, Oak, Maple, Knotty Idaho White Pine, Knotty Western Red Cedar, Bayott, Prima Vera, Satinwood, Brazilian Rosewood, English Harewood, Zebrawood and other woods in standard sizes and thicknesses.

Architectural plywood and panels faced with exotic woods manufactured on special order.

Technical plywood conforming to engineering requirements for Aircraft, Marine and other industries are manufactured to specification.

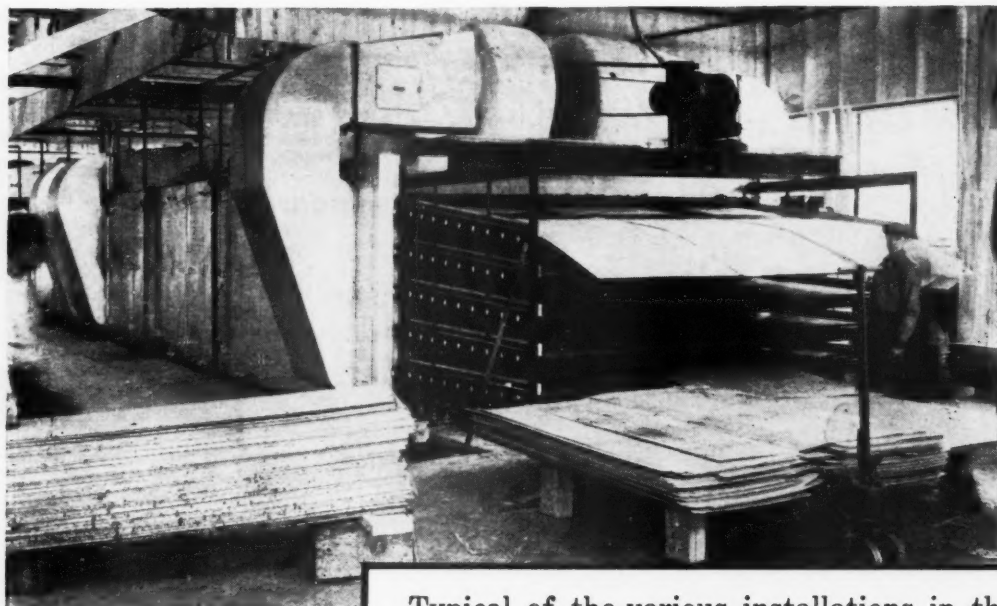
Trained personnel at all our distributing centers available for full information on our products.

**UNITED STATES
PLYWOOD**

C O R P O R A T I O N

Executive offices: 616 West 46th st., New York, N.Y. Fir plywood Mills: Seattle, Wash.
Branch offices and warehouses: New York, Boston, Philadelphia, Brooklyn, Newark, Rochester, Detroit, San Francisco, Los Angeles and Seattle.

YOUR CUSTOMERS WILL LIKE *Smith-Ply Plywood*
BECAUSE IT IS EXCEPTIONALLY BRIGHT, SOUND AND CLEAN
AND BECAUSE IT IS PRECISION BUILT FROM THE FINEST
DOUGLAS FIR PEELER LOGS.



**EXPERIENCED
PLYWOOD MEN**

Typical of the various installations in this modern Plywood Plant of Smith Wood-Products is the latest type Coe Dryer pictured above. Here green veneers are precision dried in this mechanically controlled machine assuring sound bone-dry stock.

are in charge of production with the finest and latest equipment for the manufacture of plywood at their command.

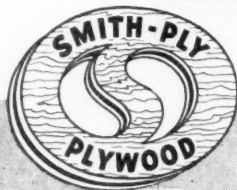
In addition, we have a 10-opening hot plate press and offer resin-bonded panels which are fully water-proof, desirable for concrete forms and outside exposed work.

SMITH-PLY is exceedingly strong for its weight, does not split or shrink, is light and easy to handle and "work". In fact, it is real lumber in its lightest and most workable form, can be finished exactly as you would solid fir lumber.

For Quick Service Wire Direct to
PLYWOOD SALES OFFICE
 1008 Pacific Bldg., Portland, Oregon

Plants—Coquille, Oregon

General Offices—1635 Dierks Bldg., Kansas City, Mo.



Also manufacturers of Port Orford Cedar lumber, battery separators, and veneer, Venetian Blind Stock, and Douglas Fir Lumber.

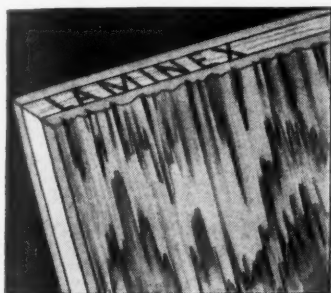
Smith Wood Products, Inc.
SMITH-PLY FIR PLYWOOD

Only LAMINEX

ENGINEERED PLYWOOD

Gives you all Five...

The development of *improved* plywoods by Wheeler Osgood enables new uses, economies and profit possibilities. Attractive appearance is combined with strength. Utility and satisfaction are assured by the LAMINEX method of manufacture.



RUSTIC LAMINEX

Rustic LAMINEX

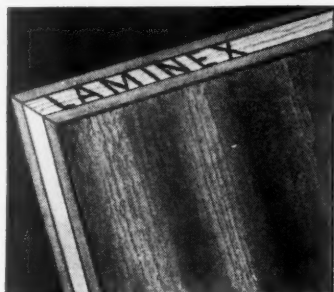
The attractive, raised and indented surface provides an effect as different and interesting as weathered driftwood for use in cabins, recreation rooms, taverns, restaurants, etc. Innumerable color combinations may be applied successfully in addition to standard wood finishes. RUSTIC LAMINEX affords an economical means of securing different, antiqued wall and ceiling effects, economically. Write for sample.

Standard LAMINEX

Engineered lumber of three or more layers, each one cross-grained to the next. Scientifically dried and bonded together by special LAMINEX water-resistant cement. LAMINEX Plywood is light, strong and easy to work. It is available in all standard sizes. Thicknesses range from 3/16 in. to 1-1/8 in.



STANDARD LAMINEX



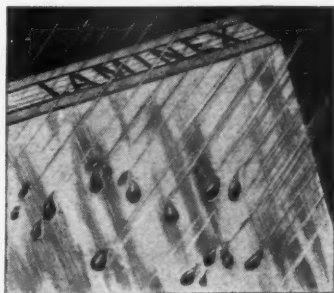
PHILIPPINE MAHOGANY LAMINEX

Philippine Mahogany LAMINEX

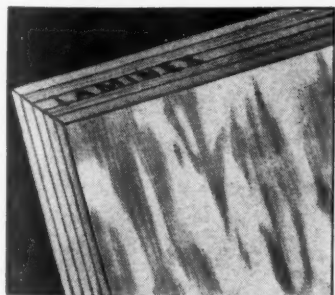
The striking beauty of grain and figure provides one of the best means of securing, economically, maximum richness and distinction in wall treatment. Constructed by the LAMINEX process, the attractiveness of the ribbon grain effects is combined with the strength and workability of other Wheeler Osgood plywoods. It may be finished in any of the shades from light oak to the deep reds. Write for complete information.

All-Weather LAMINEX

This LAMINEX plywood has been developed by Wheeler Osgood for exterior use. Produced by the hot-plate process, with a resin binder, it is immune to the effects of weathering. Temperature and moisture changes do not cause springing or separation of plies. The glass-smooth surfaces of All-Weather LAMINEX are easy on paint. Write for complete information.



ALL-WEATHER LAMINEX



PLYFORM LAMINEX

Plyform LAMINEX

A light, strong board designed especially for economical and efficient concrete form construction. Large-sized panels, tight-fitting joints, accurate cutting to size result in smoother concrete surface with a minimum of fins. Bracing is simplified, stripping is easier, handling faster. Plyform LAMINEX may be used many times—is available in intermediate sizes up to 4 x 8 ft., or larger, when specified. Write for sample.

WHEELER OSGOOD SALES CORPORATION

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New York • San Francisco • Los Angeles • Dallas • Wichita • Tacoma

Wheeler Osgood Sales Corporation
122 S. Michigan Ave., Chicago, Ill.
Send complete information about the LAMINEX product checked.

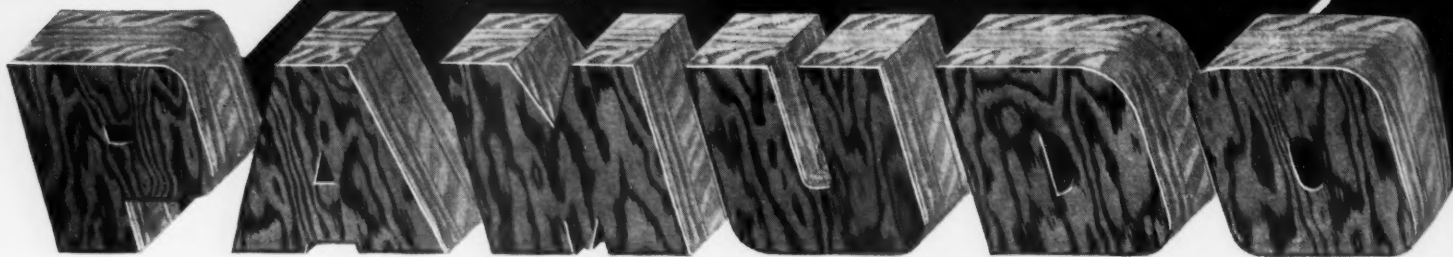
☐ RUSTIC ☐ STANDARD ☐ ALL-WEATHER
☐ PHILIPPINE MAHOGANY ☐ PLYFORM

Name

Address

City

State



Sold by Dealers

THE PAMUDO DOCTRINE

TO DISTRIBUTE . . .

QUALITY MILLWORK PRODUCTS . . . THROUGH THE RECOGNIZED RETAIL DEALER.

TO ENDEAVOR . . .

WITH OUR MODERN AND PROGRESSIVE POLICY TO MAINTAIN AN INDEPENDENT PRICE STRUCTURE.
TO ENABLE THE DEALER TO OBTAIN HIS MILLWORK REQUIREMENTS AT LOWEST FACTORY PRICES, PLUS A MINIMUM SERVICE CHARGE FOR LESS THAN CARLOAD QUANTITIES.

TO ESTABLISH . . .

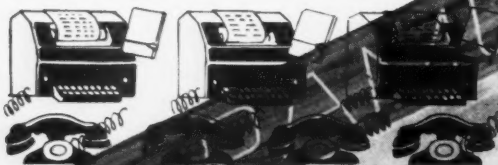
WITH A COMPLETE AND THOROUGH STOCK
WITH MODERN FACILITIES AND EQUIPMENT
WITH A COURTEOUS, EXPERIENCED AND EFFICIENT ORGANIZATION

AN UNEXCELLED REPUTATION FOR INTEGRITY — SERVICE — AND FAIR DEALING



Five modernly equipped warehouses strategically located, carry complete stocks of PAMUDO plywood, doors, frames, mouldings, sash, glass, and wall-boards.

Supplementing these transportation facilities and to provide rapid and economical delivery PAMUDO company owns trucks to serve the trade areas from PAMUDO warehouses.



Linked with the consuming centers by private teletype and telephone communication, PAMUDO'S trade is given speedy, careful and detailed attention.

PAMUDO representatives are trained specialists in their field. In trade relations their positions constitute the proportions of business counselors.

PACIFIC MUTUAL DOOR COMPANY

A National Organization

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PAMUDO

Everywhere

The Quality of PAMUDO PLYWOOD

is unexcelled because constant vigilance keeps manufacturing standards uniformly high. For sixty years the Olympia Veneer Company has been producing the plywood that bears the PAMUDO trademark, and sent to pave the world at the equator. Year after year, Olympia has manufactured integrity into plywood—that plywood is PAMUDO.

Durability of PAMUDO PLYWOOD

is attested everywhere and in all kinds of construction. Doctors, architects, builders, contractors, and carpenters testify as to its worthiness, sturdiness, and unyielding forthright toughness.

Five Rigid Inspections Insure Uniformly Perfect Plywood

1

From the great stands of Douglas Fir, which attain their greatest magnificence in the Olympia country, the "peeler logs" are selected. Only the choicest trees produce "peelers" of quality satisfactory to Olympia.



2



Skill, developed by experience, is devoted to the selection of "peelers" to go to the Olympia plant. Soft textured, light colored fir is essential.

3

In the "peeling" operation unceasing vigilance is used to see to it that uniformity is maintained and this watchfulness continues through the cutting and drying operations where primary classification is made.



4



Extremely rigid inspection and control is maintained over the gluing and pressing operation as regards the (a) moisture content of veneers, (b) quality of glue, (c) quality of glue spread, (d) assembly time in package, (e) temperature of veneer being spread, (f) pressure applied in press and (g) accuracy of press. After setting, the panels are sanded and inspected for thickness and smoothness and inspected again for grade.

5

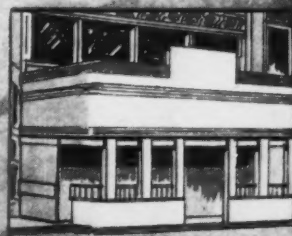
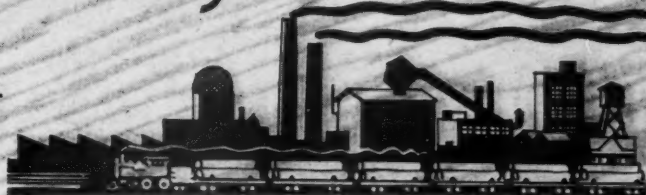
All panels which have passed under the rigid scrutiny of experts in manufacture are given a final inspection by unbiased Douglas Fir Plywood Association Inspection Bureau's trained staff and in accordance with U. S. Commercial Standards.



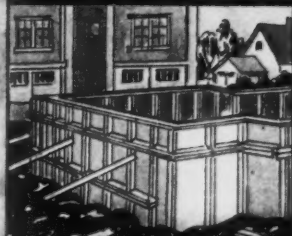
OLYMPIA VENEER COMPANY

Olympia, Washington

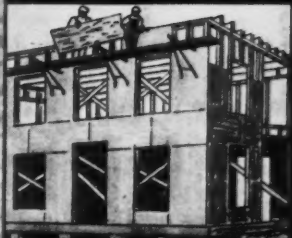
MODERN PLYWOOD
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TEMPORARY FRONTS



CONCRETE FORMS



SHEATHING





SEZ' GLOOMY GUS"
THAT PLYWOOD CUSS:-

"This year one hundred and eighty-three million feet (183,000,000) of Douglas Fir Plywood were glued with KASENO PLYWOOD GLUE."

For uniform, strongly glued panels

SPECIFY

KASENO
PLYWOOD GLUE

Adhesive Products Co., Seattle

ROBIN BRAND *Douglas Fir* PLYWOOD



STOCK PANELS

3/16" to 1 1/8" thick. 12" to 48" wide. 48" to 96" long. Special sizes to order.

CONCRETE FORM MATERIAL

Made with highly water resistant glue. Either treated with form oil or untreated. 3- and 5-ply. Standard sizes.

SHEATHING

Unsanded 3-ply and 5-ply for sheathing and sub-floors.

AUTO AND INDUSTRIAL STOCK, rough finish

A Complete Service on Douglas Fir

Doors, sash, finish, mouldings, ceiling, flooring, drop siding, finish lumber, casing and base.

Write for particulars of our new, light-weight yet sturdy garage doors at money saving prices.

ROBINSON MANUFACTURING CO.

**EVERETT,
WASHINGTON**

Will Stay Sold on the Job . . .

Behind every foot of TRU-BILT Plywood is outstanding skill and experience. Using the choicest logs obtainable from the great forests of the Pacific Northwest, every machine and every activity in our plant is tuned to produce a product that in every sense of the word means TRU-BILT—a product designed to give more real value at no greater cost—to stay sold on the job.

TRU-BILT PLYWOOD PRODUCTS ARE
STRONG, RIGID, CRACK-PROOF,
BEAUTIFUL, AND T-SQUARE

West Coast Plywood Co.

Aberdeen, Washington

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Smartness

WITH
**Real Wood Paneling
AT LOW COST**



ART-PLY

★ THE INLAID PLYWOOD ★
with invisible sealed joints

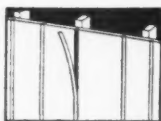
● Art-Ply has found unparalleled acceptance in residential and commercial building because it solved the "joint" problem for popular Douglas Fir wallboard. No other method has proved so acceptable to the trade or so ingenious in decorative possibilities.

Art-Ply Now Available in Every Territory . . . Complete Specifications in 12-Page Colored Insert in Sweet's 1938 Catalogs

Art-Ply is manufactured in the heart of the Douglas Fir area by the Vancouver Plywood & Veneer Company; manufacturers of famous Van-Ply Douglas Fir panels.

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Joints are concealed as well as sealed with strip of inlaid matched moulding. Simple to put up, easy to handle. 32 sq. ft. go up at a time.

★
**You can't see where
the panels join**

ART-PLY, inlaid multi-paneled sections come in 4 standard patterns. Sizes 4 ft. x 8 ft.; 3-ply thickness durable Douglas Fir.



VANCOUVER PLYWOOD AND VENEER COMPANY
Vancouver, Washington, U.S.A.

Please send me more information about ART-PLY.

Address.....
Name.....

AB-112471

Cut Pitch-Pockets Out of Plywood 10 TIMES FASTER with SKILSAW

● You can save considerable time and labor costs and do a much cleaner job with SKILSAW Model "J", the ideal electric handsaw for plywood plants. It is fast, powerful and easy to handle. Only 14 in. long, weighs only 11 lbs., can be operated with one hand. Equipped with a special grooving cutter, it cuts out pitch-pockets evenly, accurately and much faster than by hand!



For 17 years SKILSAW has been the unquestioned leader among electric handsaws . . . because (model for model) it has more power, is built stronger, will do more sawing jobs! Cuts wood, metal, stone, compositions. Works from any light socket. 9 Powerful Sizes.

Sold by selected distributors
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**Specify
"RESNPREST"**

Fabricated—in a hot press with resin adhesives

Guaranteed—water proof, fungi proof, termite proof bond

Manufactured—by M & M Woodworking Co., Kenton Station, Portland, Oregon

BUFFCO-TRIM



FOR BUFFCO-PLYWOOD INTERIORS Wrapped In Cellophane

BUFFCO-TRIM Rosettes reach the job dry. This convenient method of packaging makes them easy to stock and easy to sell. BUFFCO-TRIM mouldings are wrapped in heavy craft paper, twenty pieces to the bundle. This assures their delivery to you in first class condition—bright, clean and dry.

BUFFCO-PLYWOOD and BUFFCO-TRIM are available in Philippine Mahogany as well as Douglas Fir. Write for complete descriptive circular.

Ask your Dealer about BUFFCO-PLYWOOD PANELS—TRIM and DOORS—LUMBER—SASH—MOULDINGS—COLUMNS—FINISH.

Dealers—order through your Millwork jobber

BUFFELEN LUMBER & MFG. CO.
TACOMA, WASH.

K & E WYTEFACE

STEEL
MEASURING
TAPES

*Easy
to read...*

easy to clean, and the crack-proof white surface protects the steel from rust. Ask your dealer, or write for a complete catalog.



KEUFFEL & ESSER CO.
HOBOKEN, N. J.
NEW YORK CHICAGO ST. LOUIS SAN FRANCISCO DETROIT MONTREAL



This Fellow Makes
BIG MONEY
All the Year 'Round

AND YOU CAN TOO!

There are no seasonal slumps for this fellow—No Sir! He owns an American floor sander and if building "slows down" a little in the winter, he gets all the work he can handle resurfacing floors in the older homes. "New floors for old" is his motto. He is his own boss and all the profits go into his own pockets.

No experience is required to do floor surfacing work. Within a few hours you can run one as well as an "old timer." Stop working for somebody else on daily wages and start making all the profits for yourself. Own an American sander.

Get complete details, catalog and price without cost or obligation by signing and mailing in the coupon below.

THE AMERICAN

FLOOR SURFACING MACHINE COMPANY
511 So. St. Clair Street, Toledo, Ohio

Gentlemen:

- ☐ Send complete details and prices on your American floor sanders without any cost or obligation to me whatsoever.
- ☐ I am a contractor and want machine for own use.
- ☐ I am thinking of getting into business for myself.
- ☐ I already own one—quote trade-in value.

Name

Street

City State

**BATHROOMS CAN BE
SMART and THRIFTY, TOO—
with floors of Linoleum
and walls of Linowall**



Armstrong's Linoleum and Linowall make this modern bathroom the showplace of the house. Floor is No. 021 Marbelle. Walls are Linowall No. 703 Black, with horizontal stripes of Linowall No. 704 Ivory.

IT is surprising how little it costs to make a house more saleable with floors of linoleum and walls of Linowall. Bathrooms, especially, are made more beautiful and appealing with these two nationally advertised Armstrong products.

Armstrong's Linoleum is made in thicknesses for every purpose and every pocketbook. Many attractive patterns enable you to choose the right floor for any color scheme. Or special floors with inset figures can be designed to order.

Linowall is a permanent, washable linoleum-type wall covering that comes in many rich colors. Your customers will like it because it is fade-proof and easy to keep clean.

Send ten cents now for a color-illustrated copy of "Floors That Keep Homes in Fashion." Armstrong Cork Products Company, 1218 State Street, Lancaster, Pennsylvania.



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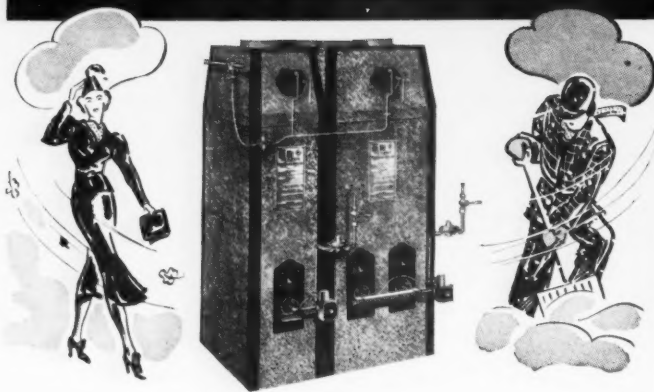
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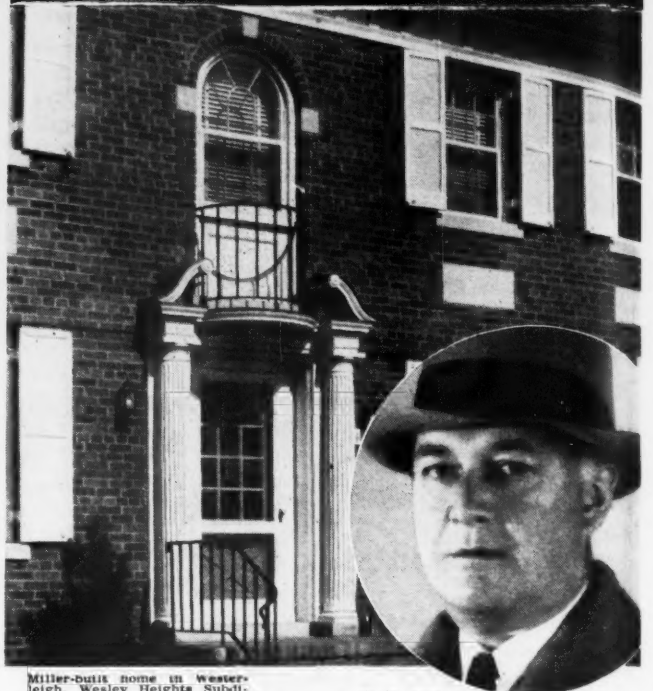
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No. 605 Jack, 14" long, 2" cutter



"Bed Rock" Planes are also made in 7, 8, 9, 11½, 14, 18, 22 and 24 inch lengths, weigh from 2½ to 10 pounds, and have cutters from 1½ to 2½ inches wide. The cutter, frog and bottom are so designed that they are as vibrationless as one solid piece of metal. Frog may be adjusted forward or backward without removing the lever and cutter.

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No. 5 Jack, 14" long, 2" cutter

No. 5½ 11½" x 1¼"
No. 5½ 15" x 2⅝"



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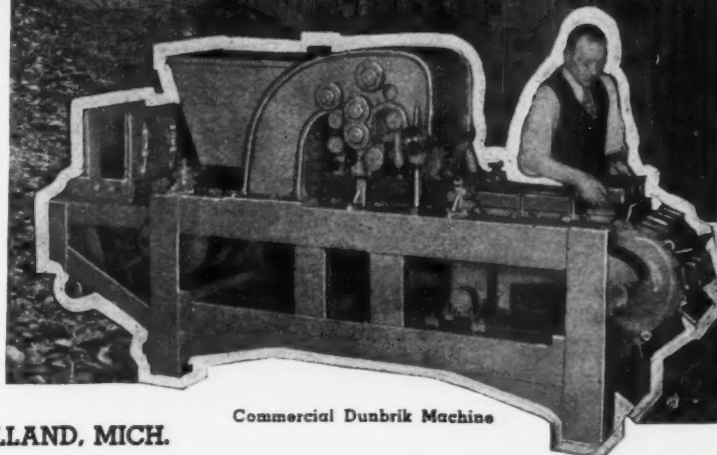
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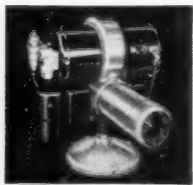
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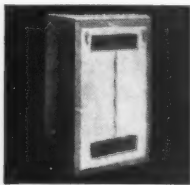
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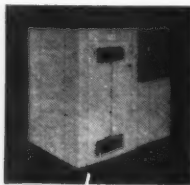
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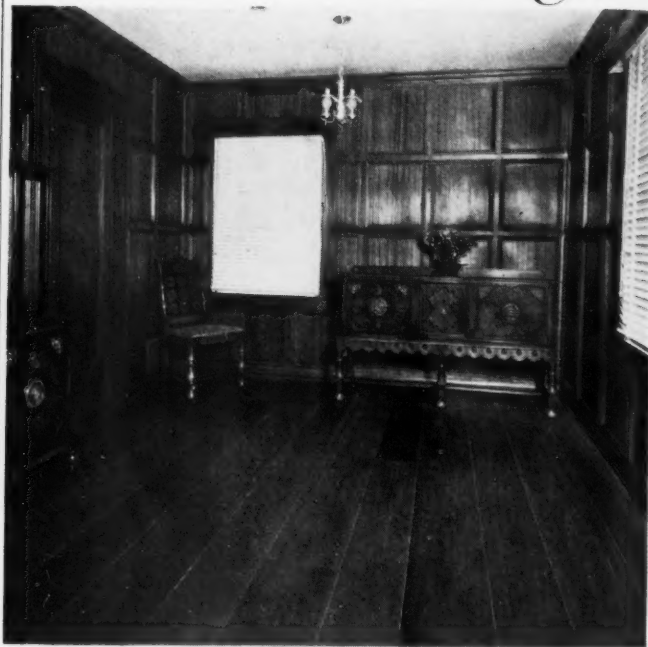
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FIXTURES

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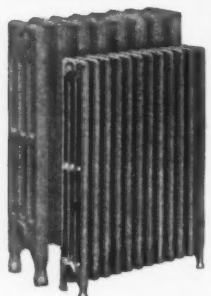
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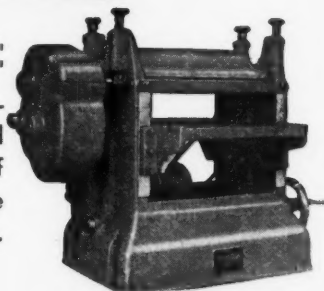
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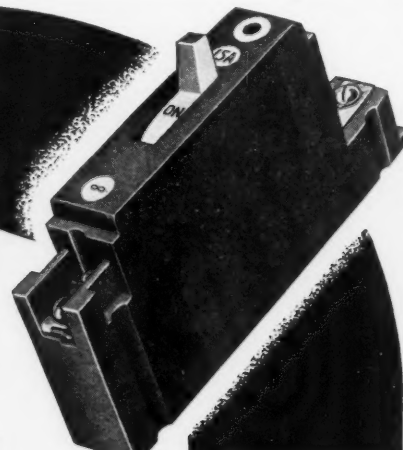
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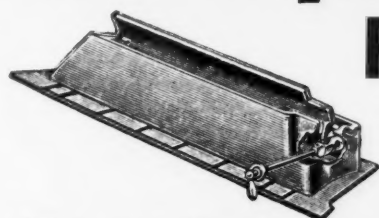
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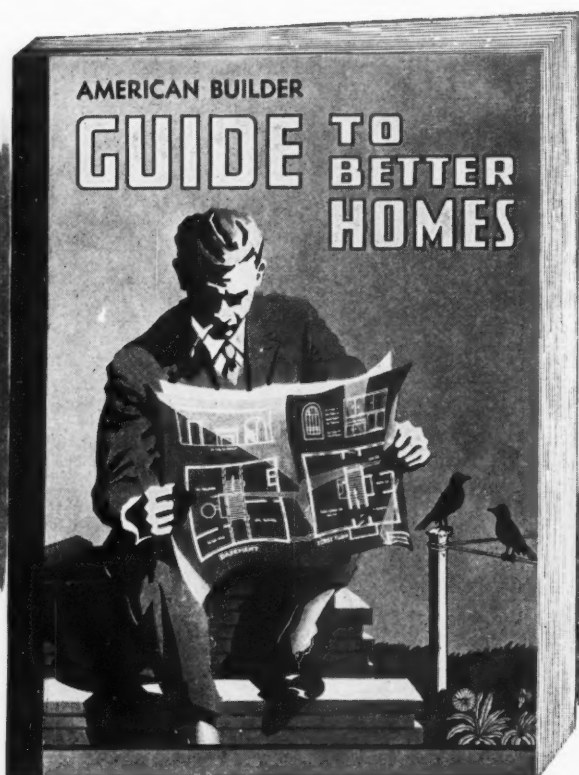
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It is not a cure-all, of course, but if your home-hungry clients are getting the jitters, you will find in its pages a dependable help in getting them rid of them. And quick solutions for many of your own problems, as well.

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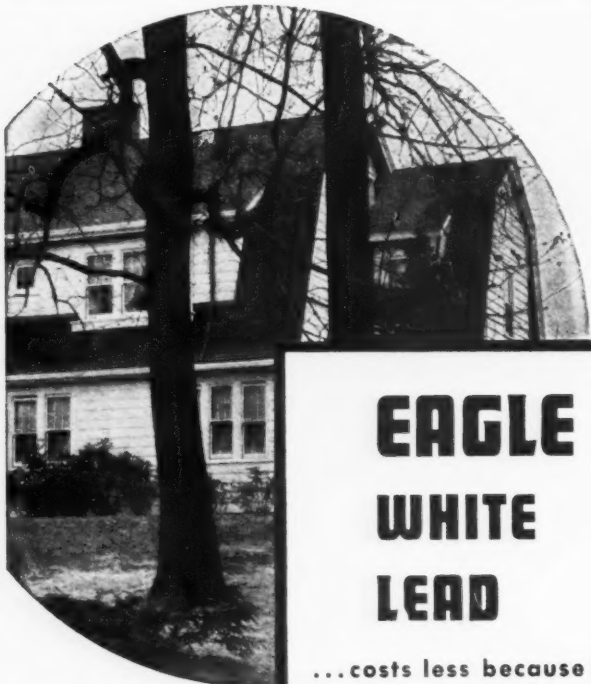
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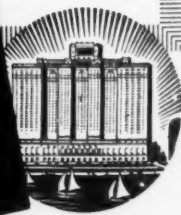


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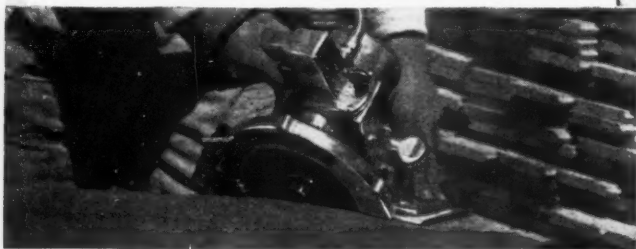
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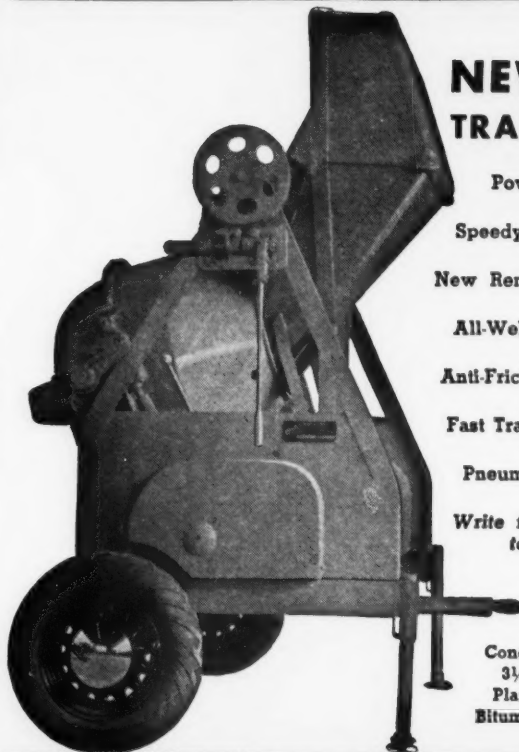
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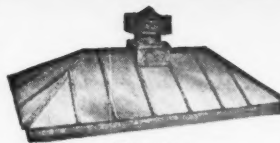


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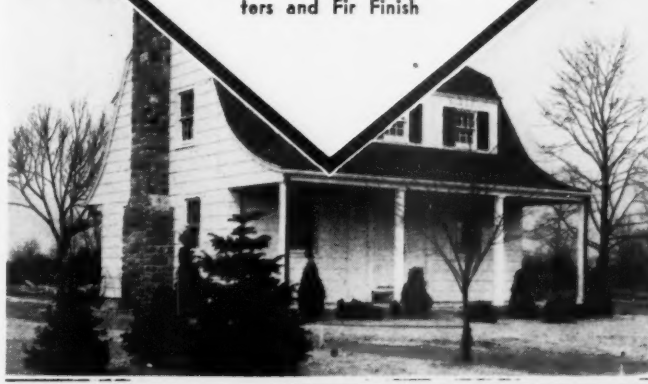
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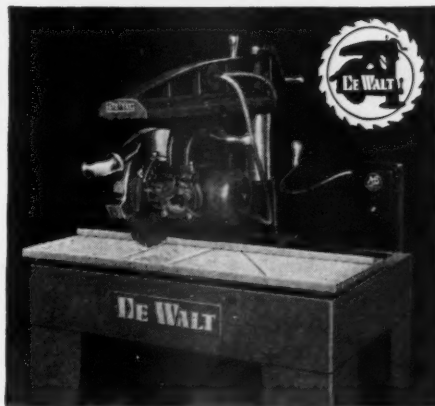
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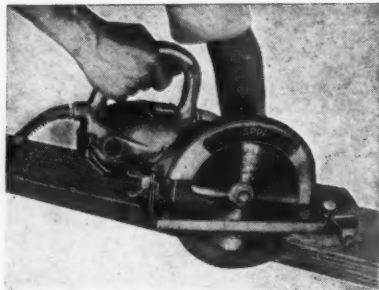
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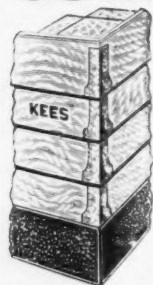
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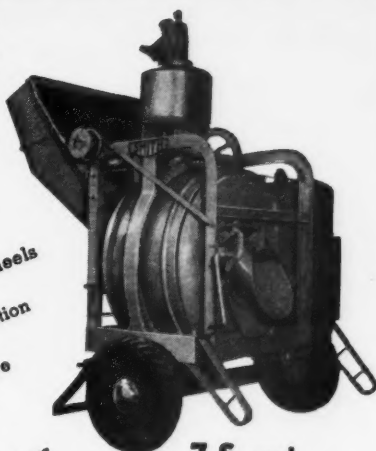
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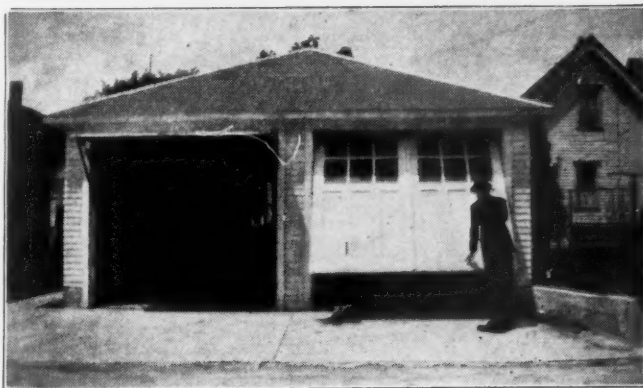
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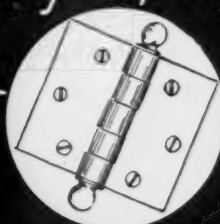
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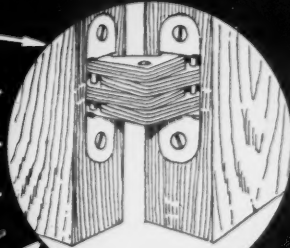
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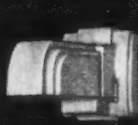
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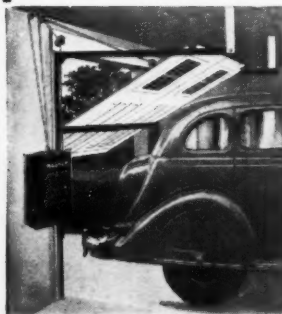
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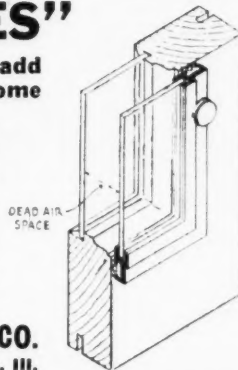
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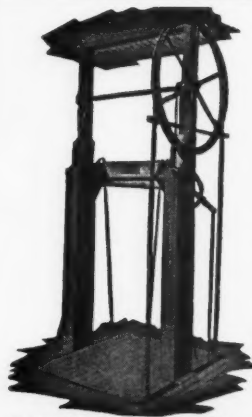
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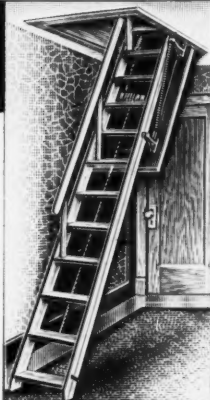
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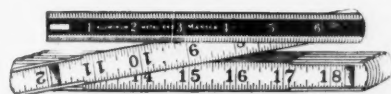
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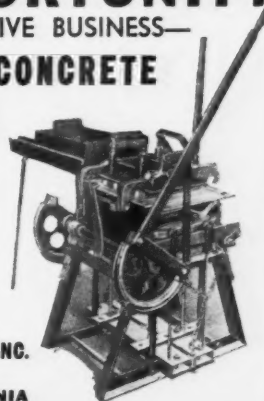
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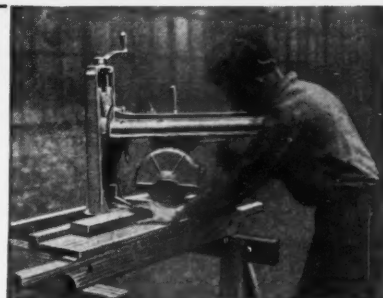
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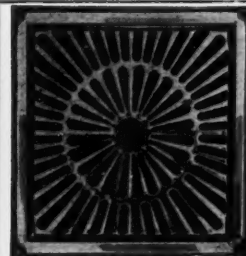
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BUILDING MATERIALS

399—"Aluminum Paint Manual"—This is a well prepared handbook of 106 pages, containing interesting information regarding aluminum paint, its characteristics, pigments and vehicles, how to test aluminum paint, methods of application, and directions for use of aluminum paint on various types of surfaces. An important section presents directions for interior painting with aluminum paint; also specifications for aluminum paint vehicles and recommendations for handling and storing Alcoa Albron paste and powder. An unusual paint chart is included.—ALUMINUM CO. OF AMERICA, Pittsburgh, Pa.

400—"Basement Plans for Modern Bituminous Heating"—This is a 40-page portfolio of modern basement layouts, with a discussion of modern basement planning and a very practical section on the design and construction of storage bins for coal. How to make money and how to save money through proper basement arrangement and selection of heating equipment are brought out in connection with these designs and plans.—NATIONAL COAL ASSN., 804 Southern Bldg., Washington, D.C., and 307 N. Michigan Ave., Chicago.

401—Fire Protection with Calcium Chloride Fire Pails—An important little 22-page booklet, "All's Well When Fire Pails and Barrels Are Always Ready," is being distributed in the interests of fire protection. Solvay Calcium Chloride makes a non-freezing solution for winter use, and a solution that will not evaporate in warm weather, making it ideal for fire pail first aid fire equipment. Fire pails in lumber yards and on new building jobs under construction are recommended. Get this little book and study it.—SOLVAY SALES CORP., 40 Rector St., New York City.

402—Palco Wool Insulation—A de luxe 16-page illustrated catalog presents Palco Wool which is made from redwood bark by a special process. Widely used on the Pacific Coast, this old-time insulating material in its present refined form is now reaching out to wider markets. This new catalog shows comparative insulating value and numerous uses for this material.—THE PACIFIC LUMBER CO., San Francisco, Calif.

403—Kimsul Insulation—"A Most Important Development in Building Insulation" is described in a new 20-page folder entitled, "Kimsul, a Unique Expanding Blanket Building Insulation." The table of contents includes such interesting material as (1) Expandability—the new development in building insulation; (2) Physical Properties of Kimsul; (3) Insulating Vertical Walls; (4) Insulating Sloping Roofs; (5) Insulating Ceilings, Floors, Odd Corners and Spaces, and (6) Estimating amount of insulation required. This handbook also discusses heat losses through different thicknesses, with a discussion of fuel savings.—KIMBERLY-CLARK CORP., Neenah, Wis.

404—Celotex Cemesto—A new 8-page 2-color circular presents Cemesto, the asbestos cement-clad insulation board. The Celotex Corp. plant at Metuchen, N. J., is now in full production on Cemesto. This is composed of an insulating core of Celotex surfaced on one or both sides with fire-resistant asbestos cement, making it a complete wall panel for interior and exterior wall construction for factories, homes, garages, filling stations, cabins, vent ducts, etc. It comes in four thicknesses ranging from ½" to 2". Full details presented in this circular.—THE CELOTEX CORP., 919 N. Michigan Ave., Chicago.

405—Huttig Windows and Doors—The Red-E-Fit rot-proof window is detailed and described in a new 4-page data sheet, "I Want That Window." A companion piece, an 8-page folder, illustrates the Huttig doors which are moisture-proof, made with genuine waterproof glue. Several popular styles are illustrated.—HUTTIG MFG. CO., Muscatine, Ia.

406—New P & S-Despard Wiring System—"Planned Electrical Wiring for More Convenient Living" is a new 12-page brochure presenting the Pass & Seymour combination convenience outlets. These include a Triplex outlet plate, two switches with convenience outlet, three-way switches, radio outlet, clock hanger outlet, switch with pilot light, etc. These are offered in several finishes, including the P & S Alabax. Photographs of well furnished rooms show clearly how these improved electrical appliances and outlets are used.—PASS & SEYMOUR, Inc., Syracuse, N.Y.

407—Modern Woco Garage Doors—A new circular illustrates the Woco 1¾ inch garage door, said to be "20% lighter and just as strong," having reference, presumably, to the old style 1¾ inch garage doors. The circular shows the new "Square Back" construction principle in which the panels are placed back of the central position, giving the door a deeper sticking on the outer face side. Under this method a greatly increased bearing surface is secured, materially strengthening the joints. These new 1¾ inch garage doors match up with the popular 1¾ inch house doors in the Woco line.—WHEELER OSGOOD SALES CORP., 122 S. Michigan Ave., Chicago.

408 Philippine Mahogany—Beautifully illustrated 16-page brochure has been prepared by the Association to further acquaint lumber dealers, contractors and architects with Philippine Mahogany and its uses for doors, interior trim and fixtures. Photographs of many distinguished installations of this fine low-cost wood are included.—PHILIPPINE MAHOGANY MANUFACTURERS' IMPORT ASSN., Inc., Los Angeles, Calif.

409—Mora Ready Finished Flooring—New descriptive circulars are ready, telling about this pre-finished, ready-to-lay oak flooring, which has a nailing notch cut for the nail head the entire length of the flooring strips. The wedge shaped tongue makes it easy to lay this flooring with tight joints. This ready finished flooring is varnished, polished and waxed at the factory, ready for use when laid. Especially useful for remodeling work.—PAUL O. MORATZ, Bloomington, Ill.

American Builder,
105 W. Adams St.,
Chicago, Ill.

(December, 1937)

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